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JOURNAL
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VOL. XI APRIL, 1929 No. 2

A STATISTICAL EXAMINATION OF THE PROBLEM OF HANDLING ANNUAL SURPLUSES OF NON-PERISHABLE FARM PRODUCTS

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A discussion of ways of dealing with farm surpluses may consider either the institutional means which might be established for disposing of surpluses, or the possibilities of increasing returns to farmers by disposing of the surpluses in various ways. This paper will be confined to the second problem. The possible effects on returns to farmers of such operations as storing from year to year and export dumping will be considered in the light of what is known about price behavior from statistical studies of prices.

STORING SURPLUSES FROM YEAR TO YEAR

Passing over storing from one time to another within the same crop season and storage by farmers themselves, both of which are outside of my subject, storage from one crop season to another may be taken up first. If there were some agency with the funds and power to buy up part of the supply in one year, and to resell after the next crop is harvested, or later, it could conduct such storage operations as it saw fit. The simplest possible case is that in which the agency

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This paper was read at the nineteenth annual meeting of the American Farm Economic Association, at Chicago, Illinois, December, 1928.

Acknowledgment is due to the following persons, who have generously permitted me to make use of unpublished price-analysis studies in the preparation of this paper:
E. M. Daggitt, studies of factors affecting wheat prices.
L. H. Bean, a study of the probable effects of export dumping of wheat.
Owen L. Dawson, studies of the export demand for various pork products.

would buy only in years when prices were so much below the usual trend that there would be reasonable probability of reselling at a profit within the next year, and would buy in quantities sufficiently small so as not to materially affect the level of price either at the time of purchase or at the time of sale. We may judge of the possible results by estimating how such operations might have worked out in the past. Considering the years from 1900 to 1927, except during the war period, there have been 7 years when prices were so low that cotton might have been purchased and stored with reasonable hope of profit, and 5 occasions when wheat might have been purchased.[1] If the operations covered 500,000 bales of cotton, and 100,000,000 bushels of wheat each year (which is certainly as large as could be reasonably expected not to affect prices) the storing agency would have made profits ranging in different years from 4 million dollars to 18 million dollars on each cotton operation, above storage costs, and interest at 6 per cent; and ranging from 4 millions loss to 18 millions profit on the several wheat operations.[2] If the net profits had been distributed to the producers, that would have raised the value of the cotton produced during those years by seventh-hundredths of a cent per pound, and the price of wheat by one-tenth of a cent per bushel. Even if 3 million bales of cotton had been stored each time without disturbing prices (and this is certainly more than could be so stored) the profits, distributed to producers, would have increased the average price for those years by but two-tenths of a cent per pound; even for 1926, the increase would have been not quite one cent per pound. Oats shows similar low increases in value. It is quite evident, therefore, that to be effective in increasing returns to farmers the agency would have to store in sufficient quantities so that its action would affect the level of prices.

The possible results of storing in such quantities as to affect the price may be worked out either assuming that the resulting changes in price do not cause changes in subse-

[1] The years are 1901, 1902, 1908, 1911, 1920, 1921, and 1926 for cotton; and 1906, 1912, 1913, 1922, and 1923 for wheat.

[2] The prices used are the average prices for the season. If monthly prices were used, and the agency were able to buy at the lowest month and sell at the highest each year, its profits would have been correspondingly increased. But that is a far-fetched possibility.

quent production, or assuming that the price changes do cause changes in production. The simpler case of no effect on production will be examined first, leaving the more complicated result for the later examination.

Assuming, then, that the storage operations would have tended to raise the price when the purchase was made, and to depress the price when the stored quantity was sold, and further assuming that subsequent production was not affected by these price changes, we may examine the record of past years to see how such operations would probably have worked out. Four questions are involved:

(1) How much would the operations have affected prices received by farmers?

(2) How much would the operations have changed the gross income received by farmers?

(3) Would the storage operations have shown a profit or a loss on the quantity stored?

(4) How would the gains or losses to farmers compare with the gains or losses on the quantity stored?

These questions are all quantitative, and quantitative conclusions are necessary to answer them. It is necessary therefore to estimate how farm prices would have been raised in any given year by withdrawing a stated quantity from the market, and how far they would have been decreased in a subsequent year or years by adding that quantity to the supply to be disposed of. Our knowledge of the effects of actual supplies upon prices is far from perfect; in addition, in making such calculations an assumption must be made as to whether withdrawing part of the supply from the market would have the same effect on prices as if the actual supply were that much smaller. An authoritative answer to these questions for any one commodity would require extended research work. Such complete research has been impossible. Even then the result would be but an estimate, whose degree of accuracy could be proved only by actual experiment.

In view of the importance of the subject, however, it is of interest to make a survey of the possible results, using such price analysis results as are available. In considering the conclusions reached by this tentative examination, it must be

remembered that these are intended primarily as illustrations of the method of approach, rather than as conclusive and final estimates of the results to be secured. All of the figures which will now be considered may be subject to material revision on more extended analysis.

Storing Wheat

The possible results of storing wheat from one crop year to another will be considered first. In estimating the effect of withdrawing part of the supply from the market, two assumptions were made: (1) that the resulting increase in price would reduce our consumption and export of wheat just as much as would a corresponding increase in price due to a short supply; and (2) that the action of the agency in storing wheat would cause those who buy wheat for storing until another year to reduce their purchases to the minimum amount needed for mill operation and usual reserves.[3]

The point should be emphasized that there can be no "psychological effect" of storing on prices unless someone is induced to buy the supply that is left for sale at the price that is established. The consumer is certainly likely to continue to respond to price as he has done previously, and the storer-for-a-profit is more likely to be intimidated than encouraged by the fact that the agency is also storing.

Figure 1 shows the estimates as to the probable effects of storing wheat. To understand just how these figures were arrived at, let us take a single operation and follow it all the way through.

In 1906, for example, the price of wheat averaged 71 cents.[4] This was considerably below the trend of prices in previous years, so that it might have seemed reasonable to expect higher prices for the subsequent crop. Let us assume that at the start of the season the storing agency had decided to go into the market and buy enough wheat to hold the domestic price for the 1906 crop ten cents higher, at 81

[3] Carry-over of wheat and flour in this country consists of two portions; (a) that needed to keep milling and baking operations going on, a relatively constant amount from year to year; and (b) wheat stored in the hope of future profit, an amount varying with price. The assumption is that knowledge that the agency was storing considerable quantities would cause such speculative storers to be less optimistic about the future prices, and so would reduce their purchases to a minimum.

[4] This price and all subsequent prices used in this paper, unless otherwise stated, are actual prices, without any adjustments for differences in price level. While this gives the storage operations the benefit of the upward trend in price level before the war, it makes the estimates apply to the actual situations.

cents. The higher price would tend to reduce consumption. Our studies indicate that with the price increase from 71 cents to 81 cents, domestic consumption of wheat as flour and feed, and exports of wheat and flour from the United States, would be reduced by about 55 million bushels. In addition, we may assume that because of the action of the agency in storing, speculative storing would be reduced from 95 to 75 million bushels, further reducing the demand by 20 millions. Adding the reduction in storage takings to the reduction in consumption and exports gives 75 million bushels as the estimated quantity the agency would have had to purchase and store in 1906, to advance the price by 10 cents per bushel. (As our knowledge of the relation of wheat supplies to prices is not exact, this quantity is only a rough estimate. It is possible that it would have been necessary to store as much as 140 million bushels in order to raise prices 10 cents.)

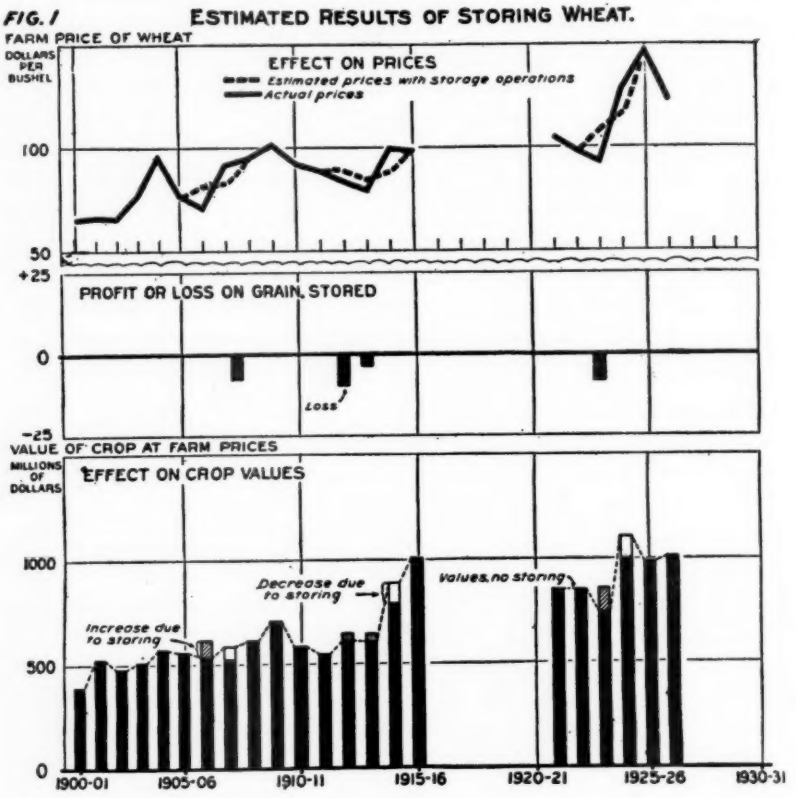
The next year (1907) the price was 91½ cents. With no special storage operations in 1906, the carry-over in this country at the beginning of the 1907 season would have been 95 million bushels. But, with the agency storing, carry-over in the hands of others would be reduced to the minimum requirements, 75 million bushels. The agency itself would also have 75 million bushels to be sold. The carry-over into the 1907 season would then be 150 million bushels, 55 million bushels more than the 95 which would otherwise have been stored. Such an increase in supply would probably have reduced the average price for the 1907 crop from the 91½ cents which actually prevailed to 82 1/5 cents.[5] The stored wheat would have been bought at 81 cents in 1906 and sold at 82 cents in 1907. After deducting the costs of storing, the stored grain would not sell for quite what it had cost. Instead there would be a loss of about 6 million dollars.[6]

---

[5] The new price is probably more reliable than the estimate of the amount to be stored, as both the probable increase in 1906, and the probable decrease in 1907, were computed on the same basis. While using an alternative basis, mentioned later, might increase the amount needed to be stored, it would also reduce the per-bushel effect of the storage on 1907 prices and so leave the final prices at about the same point.

[6] This is figuring storage at 9 cents per bushel per year, the official cost at Chicago at that time. Commercial operators do purchase storage in large quantities at lower costs; but in view of the fact that the agency might have to pay for elevators some years it did not use them, so as to be sure of having space available when needed, the flat charges have been used in the computation. Even if storage had been figured at only 3 cents a year in 1906, that would have reduced storage costs by only 4½ million dollars, still leaving it a loss of 1½ millions.

Turning to the farmers' end of the transaction: As a result of the storage operations, they would have sold the 1906 crop at 10 cents more per bushel than they actually did, and the 1907 crop at 9.3 cents less. The 1906 crop was 757 million bushels; its value would have been increased from



537 million dollars to 613 millions. The 1907 crop was 730 million bushels; the reduction in price in 1907 would have reduced its value from 584 millions to 524 millions. (Note Figure 1.) The storage operation would thus have increased the value of the 1906 crop by 76 million dollars, but reduced the value of the 1907 crop by 60 million dollars, leaving farmers a net gain of 16 million dollars.[7] If the 6

[7] It would be more accurate to use only the quantities sold by farmers, deducting feed and seed.

million dollars lost by the storing agency were deducted from this, there would still be a net gain of 10 million dollars on the transaction.

The result of the storage operations in the other years when prices were low has been figured out in exactly the same way, except that in one case it has been assumed that wheat would be purchased and stored in two consecutive years, in 1912 and 1913, and then sold the third year, in 1914. I will not go into the other operations in similar detail, but will present the conclusions instead.

As is shown in Figure 1, the operations have been calculated so as to produce an increase of 10 cents in price for the crop of 1906; 5 cents in 1912 and again in 1913; and 15 cents in 1923. To secure these advances it would have been necessary to purchase and store about 75, 41, 45, and 88 million bushels of wheat in the respective years, judging from our price analysis studies. (These figures are only estimates—possibly they would have to be increased as much as 100 per cent to really produce the price-increase assumed.[8]) Selling the stored wheat in the subsequent years, prices would have been reduced by 9 cents in 1907, 11 cents in 1914, and 12 cents in 1924, on the basis of the same studies. As is shown in the figure, the value of the crop to farmers would have been increased more in 1906 and 1913 than it would have been reduced in 1907 and 1924, respectively, but would have been reduced more in 1914 than it was increased in 1912 and 1913. The agency doing the storing would have nearly broken even on the 1906-7 operation, but would have lost 14 million dollars on the 1912-14 operation, and made a small loss on the 1923-24 operation, deducting storage costs but no interest in each case.

Combining the changes in the values of the crop with the gains or losses on the stored grain for each operation, and deducting 4 per cent interest on the funds employed in storing, the average value of the two crops would be increased

[8] The price-consumption curve for the United States plus the price-export and price-storage curves has been assumed to give an aggregate market demand curve. If the influence of foreign supplies on our prices were also taken into account that would make the market demand curve still less elastic, and result in much larger quantities to be stored to obtain the same increase in price. If the probable world consumption curve found by Working were used instead (Jour. Farm. Econ., July 1, 1927, p. 277) about twice as much grain as stated would have to be stored to secure the price advances assumed.

by 0.6 cents per bushel in 1906 and 1907, and by 0.2 cents in 1923 and 1924; but the average value of the three crops of 1912, 13, and 14 would be reduced by 1.8 cents per bushel. These estimates indicate that there is sometimes a gain to be made by storing wheat for one year, but that there is likely to be a loss if storage operations are attempted for two years in succession.[9]

Storing Cotton

Parallel estimates of the probable results of storing cotton are presented in Figure 2. The assumptions made were the same as with regard to wheat, except that the world market for American cotton was considered, and, further, that it was assumed that the action in storing cotton would reduce the speculative storing of cotton throughout the world to half what it otherwise would have been at the new prices set by the operations. (There is no way of telling just how much the demand for speculative storing would be reduced if such storage operations were conducted, except to try and see. It would certainly be less than before, yet would hardly be eliminated entirely, so the ½ estimate has been used as a compromise.) As this speculative storing of cotton is an important element in the demand for cotton, this assumption is very important. Changing it would materially change the results of the computation—and the only way to find out just what would happen would be to try it.

The probable effect of storage operations has been worked out for cotton in just the same way that was described step by step for wheat. Thus, in 1908, the amount of cotton the agency would have had to store to raise the price by 1 cent has been determined from price analysis studies; and the extent to which selling this cotton in 1909 would depress the price that year has been estimated. This lower price for 1909 would have resulted in an increased carry-over into 1910; the amount of increase in carry-over has been estimated on the basis of past experience, and also its effect on the 1910 price. The process has been con-

[9] These wheat computations are based on preliminary studies of the effect of wheat and flour prices on consumption as flour, feed, and on carry-over. The details of the computations are shown in Tables 1 to 4.

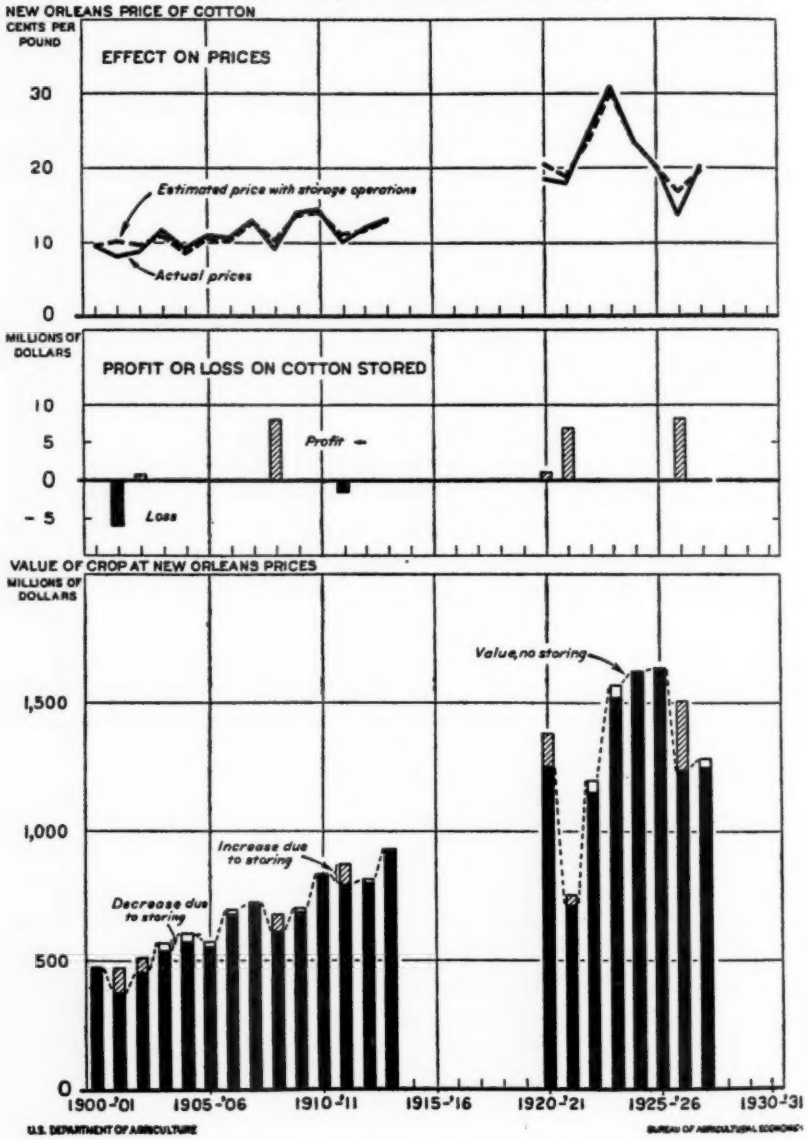
tinued in this way until the effect of the storing operation would have been dissipated.

As is shown in Figure 2, the storing operations have been so calculated as to raise the price by 2 cents per pound in 1901, 1 cent in 1902, 1908, and 1911, 2 cents in 1920, 1 cent in 1921, and 3 cents in 1926. To cause these advances, our price analysis studies indicate that the agency would apparently have had to purchase amounts varying from 0.4 to 1.3 million bales in different years. When purchases were made for one year only, as in 1908, and in 1926, consumption during the year of storage would have been only slightly reduced, the increase in total carry-over would be small, the price the following year would apparently have been only a little reduced, and both farmers and storing agency would usually have gained as a result of the operations. This is the net result after deducting from the increase in returns to farmers for the year of the storing operations the reduction in the following year due to the lower price because of the sale of the stored cotton and also reductions for several years thereafter, due to the presence of increased carry-overs on the market.[10] When, however, purchases were made for two years in succession, as in 1901-13 and 1920-22, and the accumulation disposed of the third year, the gains to farmers were not so large, and, in one case the storing agency would have lost millions of dollars.

Combining the changes in the value of the crops and the gains or losses on the stored cotton, the operations would have resulted in a net gain each time, increasing the average value of the 7 crops from 1901 to 1907 by 1/10 of a cent per pound; the three crops from 1908 to 1911, by 3/10 of a cent, the three crops from 1911 to 1913 by 2/10 of a cent, the four crops from 1920 to 1923 (storing in both 1920 and 1921), by 4/10 of a cent; and the two crops of 1926 and 1927 by 1.5 cents per pound. In this last case, however,

[10] Not only would the price be reduced the year the stored cotton was sold, but the increased supply and lowered price that year would cause an increased carry-over at the end of the second year, causing some reduction in price for the third year, and so on for several years, in decreasing intensity. The calculations were carried out to the point where the remaining increase in carry-over had been reduced to 0.1 million bales, beyond which point it was assumed that further effects on price could be disregarded. I am indebted to O. V. Wells, of the Bureau of Agricultural Economics, for bringing this point to my attention.

FIG. 2 ESTIMATED RESULTS OF STORING COTTON



the carry-over into the 1928 season would be 0.4 million bales larger than actually occurred, so resulting lowered prices and reduced income in 1928 and possibly in 1929 would have lowered the net gain from the 1926 storage operations. Apparently the possibilities of gain from storing for either one or two years are greater with cotton than with wheat if the years to store are wisely chosen.[11]

Storing hog products

There are but two sources of advantage in storing. If the product stored can be sold for more than it cost, and if that profit is secured by the storing agency instead of by others who were previously in the field, then profits may be secured without consumers paying more than they otherwise would have. But there is a second possibility of profit, if the demand by consumers is such that they will pay more for two average crops than they will pay for one large crop and one small one. In that case it is not necessary to displace previous storers in order for the new storage operations to pay profits, as the increased average price would be paid by the consumers.

Hog products serve as an illustration. They are not ordinarily thought of as non-perishable, yet they may be held under cold storage for considerable periods. Conceivably a storing agency might make arrangements with packers for them to store at its risk, gradually working fresh products into the storage holdings to prevent loss by deterioration.

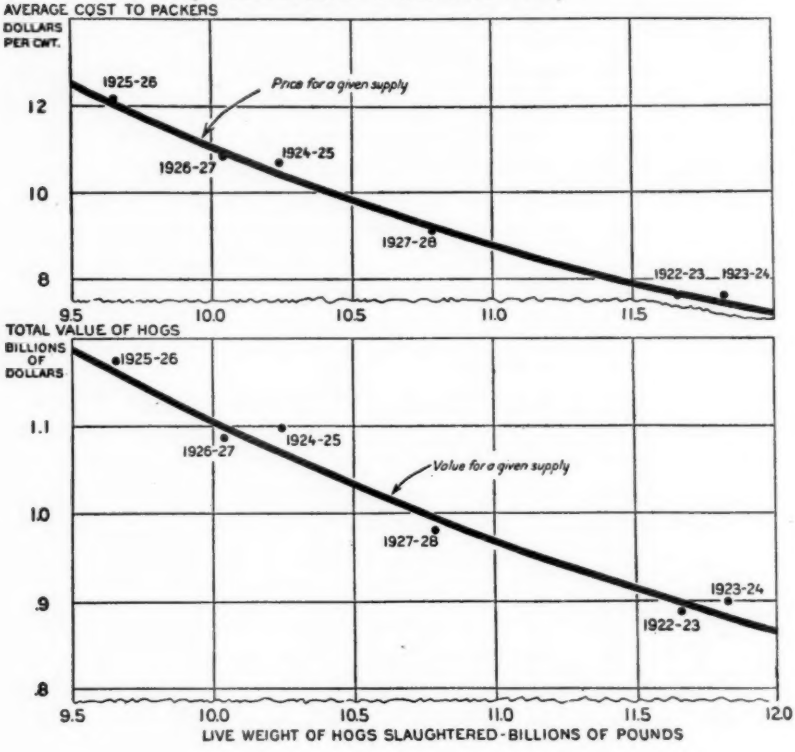
Ordinarily, carry-over of products from years of large hog supplies is not materially different than from years of small hog supplies, so the effect of the operations on the storage demands by others may be ignored. The possibility of profits from storing hog products can therefore be determined more readily than for wheat and cotton.

The necessary information is shown in Figure 3. The upper part of this figure shows the total live weight of

[11] In each case cited, the period includes the years needed to dispose of most of the increased carry-over following the storage operations. These computations on cotton are based on analyses of cotton prices by the present author, published in Foreign Crops and Markets, Nov. 8, 1926, p. 626-630, and subsequent studies by L. H. Bean, reported in "Some Interrelationships between the Supply, Price, and Consumption of Cotton." (Address before the Amer. Stat. Assoc. New York City, April 20, 1928, and mimeographed by the Bureau of Agricultural Economics.) See Tables 5 to 8.

hogs slaughtered under Federal inspection in recent years, and the average prices paid by packers. The curve shows the usual or average relation between supplies and prices, to which the individual years, shown by the dots, conform very closely. The lower part of the figure shows the total value of the hogs slaughtered each year, as compared with

FIG. 3 RELATION OF HOG SUPPLIES TO PRICES AND VALUES
Hog Year November through October
(PRICES ADJUSTED TO 1928 PRICE LEVEL)



the quantity slaughtered; while the curve shows the average total value for a given slaughter. It is evident from this curve of supply and value, that the larger the supply, the smaller the total value.

In 1923, 11.83 billion pounds of hogs were slaughtered, while in 1924 only 10.25 billion pounds were slaughtered. If the products from 830 million pounds of hogs had been

stored over from 1923 to 1924, the supply would have been 11 billion pounds in 1923, and 11.08 billion pounds in 1924. Would these two years of medium supply have brought a greater return than the one year of surplus and one of deficit?

Judging from the average relationship in other years, decreasing the supply in 1923 by 830 million pounds would have increased the value of that year's supply by about 90 million dollars; while increasing the supply in 1924 by the same amount would have reduced the value of that year's supply by about 110 million dollars. The net result, therefore, would be to reduce the combined value of the two years' supplies by 20 million dollars. Even if it cost nothing to store, the income would be reduced by averaging out a large supply and a small one into two years of medium supply.

It may be of interest to note that this conclusion can be reached directly from the shape of the supply-and-value curve in the lower part of Figure 3. It will be seen that this curve is concave; it follows as a result of this that the average of any two points on the curve will exceed the value of a point half-way between them.[12] By simply looking at the curve, it can be told at once that it would not pay producers as a whole to store hog products, even if there were no expense in the process at all.

The point as to the effect of the shape of the supply-and-total-value curve on the profits from storing has a significant bearing on the accuracy of statistical estimates as to probable gains or losses. Figure 4 shows three hypothetical supply-and-price curves in the upper portion, and three corresponding supply-and-total-value curves in the lower portion. Considering these latter curves first, it is evident that curve A is concave; and hence it would not pay to store that commodity; curve B is somewhat convex, so there might be some profit from storing; while curve C is so convex that a medium supply is worth more than either a large supply or a small supply, and hence storing might pay handsomely. Yet when we turn to the corre-

[12] Only if the curve was a straight line would the average of any two points be exactly on the curve.

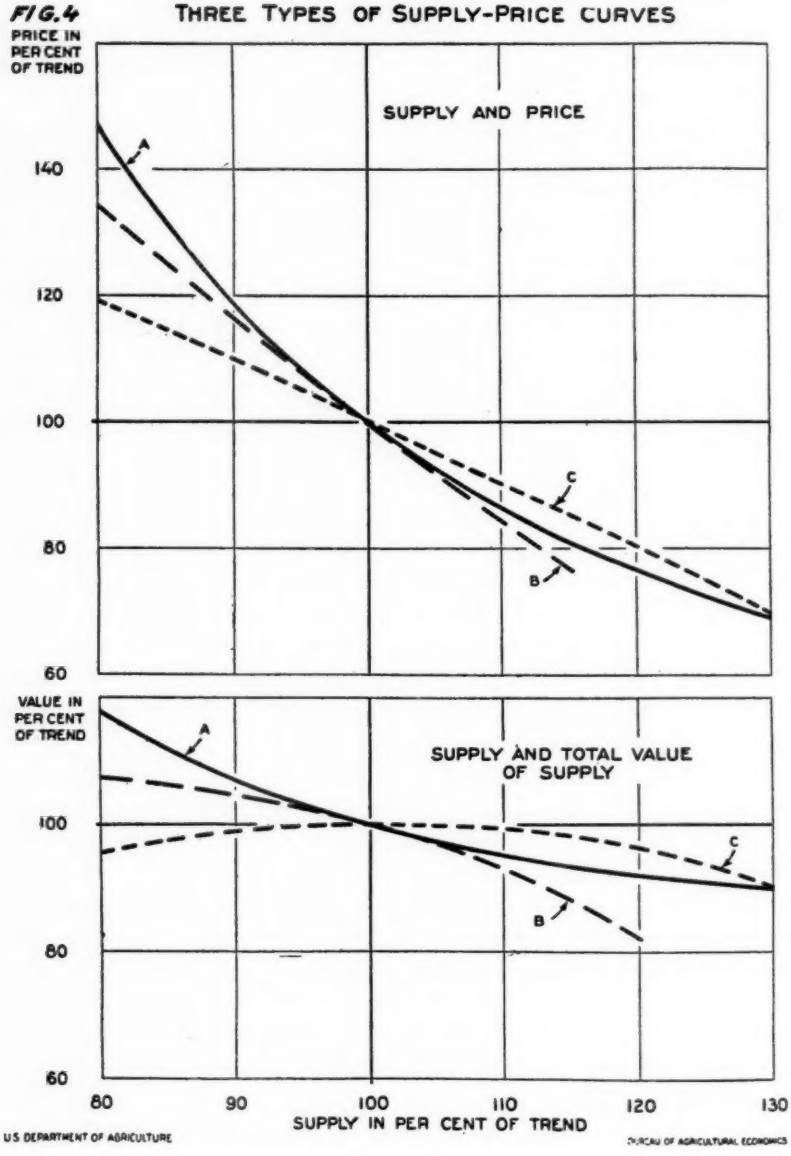


FIG. 4
THREE TYPES OF SUPPLY-PRICE CURVES
PRICE IN PER CENT OF TREND
SUPPLY AND PRICE
140
120
100
80
60
A
B
C
VALUE IN PER CENT OF TREND
SUPPLY AND TOTAL VALUE OF SUPPLY
100
80
60
A
B
C
80
90
100
110
120
130
SUPPLY IN PER CENT OF TREND
U.S. DEPARTMENT OF AGRICULTURE
BUREAU OF AGRICULTURAL ECONOMICS

sponding curves on the upper chart, we see that there is so little difference between A and B that ordinarily we would expect both to give equivalent results; while even curve C is quite similiar through its central portion. Not unless our data and technique are sufficiently exact so that we can tell definitely whether or not the relation of supply to price for the commodity with which we are working is similar to curve A on the one hand, or to B and C on the other, can we be confident that our estimates as to profits or losses from storing are correct. The probable error of our curves in many cases is greater than the differences between curves A and B. It is for that reason that I am trying to be so modest in claiming veracity for the estimates presented in this paper; until more complete and reliable basic facts are available, the accuracy of other estimates will be equally limited.[13]

The curves of supply and total value tend to be slightly convex, of the shape of curve B, for both cotton and wheat. The cotton curve is fairly accurately known; the exact shape of the wheat curve has not been conclusively determined.

Storing other products

No computations have been made as to the possibilities of profit by storing corn or oats, even though there are some indications that there might be some increase in the value of large crops by storing. With these crops, however, farmers themselves furnish the market for the bulk of the supply, so what one group of farmers gained by a greater total value, another group of farmers would tend to lose. For that reason no extended examination has been made of the possibilities of profit by storing them, and attention has been centered instead on the cash products, cotton, wheat, and hogs.

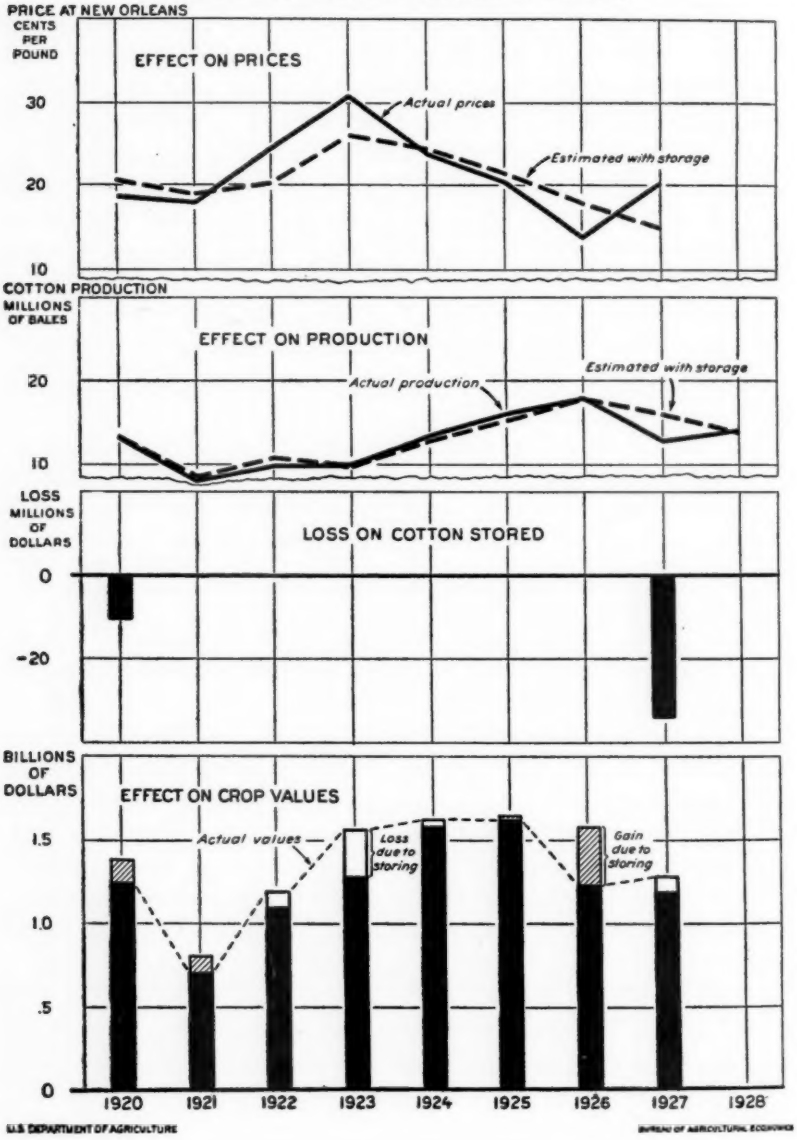
Storing, with effects on subsequent production

So far we have been considering the possible gains from storing, assuming that the changes in price to farmers did not affect subsequent production. In the case of some

[13] The curves shown in Figure 4 are all inelastic for supplies larger than 100 per cent of trend; i.e., the greater the supply, the less the total value. That is not true of all farm products; with apples and peaches, for example, price analysis studies show that the greater the supply, the greater the value. But the point as to *convexity* still holds true, regardless of the *slope* of the curve.

FIG. 5

COTTON: ESTIMATED EFFECT OF STORAGE ON PRICE, INCLUDING PROBABLE SUBSEQUENT EFFECTS ON ACREAGE



crops, noticeably cotton, it is well known that prices do affect subsequent acreages, so this relation can not logically be ignored. Taking cotton, one of the most extreme cases, as our example, we may therefore ask how storage operations would work out, if we included in our estimates the probable effects of storage operations on subsequent acreages as well. Figure 5 shows the result of such an estimate, worked out for the years 1920 to 1928.

It has been assumed that cotton was purchased in 1920 and 1921, and disposed of in 1922, just as in the case worked out in Figure 2. The effect upon acreage has been computed, beginning with 1921. The higher price estimated with storage operations for 1920, 20.6 cents instead of 18.6 cents, would probably have increased production in 1921 by nearly a million bales. The further storing in 1921, would have maintained prices at 18.9 cents that year, or a cent higher than actually prevailed. As a consequence, acreage in 1922 would have been still further increased, and with the very low yield would have made 10.8 million bales, instead of the 9.8 million actually produced. Selling the stored cotton this year and with the larger crop, the price would have been 20.3 cents instead of the 24.6 cents which was actually received. With this price, acreage would have been reduced in 1923, instead of being markedly increased; but with the increased carry-over remaining from the 1922 season, prices would not have gone so high as they actually did in 1923. As a consequence, both in 1924 and 1925 production would not have increased quite so rapidly as it actually did, and prices would have been slightly higher. With the high acreage and yield in 1926, however, prices might have been maintained at 17.8 cents had the agency purchased 1.6 million bales. With the price thus maintained in 1926, however, acreage in 1927 would not have been so sharply reduced, and production would have been 15 million bales instead of the 13 million actually produced. This fairly heavy production, together with the carry-over in the hands of the storing agency, would have reduced the 1927 price to 15 cents, if the agency had not again intervened either by holding 1926 cotton over into 1928, or by also making additional purchases to sustain the 1927 price.

The ultimate way these operations would have probably worked out cannot yet be estimated as the average price for the 1928-29 season is not yet known.

The agency doing the storing would not have fared so well, however, as it appeared it would when the effect on production was ignored. In each of these three operations the stored cotton would have been sold at less than its cost plus storage and carrying charges, resulting in a net loss of eleven million dollars on the cotton stored in 1920 and 1921, and of 34 million dollars on the cotton stored in 1926. The loss on this latter operation might have been reduced somewhat if sale of the stored cotton had been deferred until 1928 or later; but even then there would probably have been a loss.

Summing up the results shown in Figure 5, prices would have been less variable over the period examined, varying between 15 cents and 26 cents, instead of between 14 cents and 31 cents. Production would also have been more stable, rising less rapidly in the period 1923 to 1925, and declining less in 1927. Farmers' income from cotton would have been more stable, not falling so low in 1921 and 1926, and not rising so high in 1922, 1923, and 1924. This greater stability may be a desirable end in itself; if so, the storage operations would have been satisfactory. But if total income or average price during the entire period be taken as a criterion, the operations would not have been so successful. For the period as a whole while total income remained about the same, production with storing would have been slightly larger; the weighted average price of cotton to farmers would have been 4/10 of a cent lower per pound with the storage operations; and if the losses on the stored cotton were deducted, prices would have been 5/10 of a cent per pound below the actual average. If smaller amounts had been stored, so that losses on stored cotton were not incurred, or if storage operations had been begun in 1921, with only one year's operation, the estimated net results might have been more satisfactory.[14]

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[14] Table 9 shows the results of this computation. It is based on the cotton studies previously mentioned, plus a preliminary study of the effect of cotton prices on subsequent changes.

It should be noted that stabilization of prices is not stabilization of income. If the combined results of storage operations and acreage control could be so accurately worked out as to produce an exactly uniform price year after year, crop income to the producer would still fluctuate violently with variations in yield. In fact, income would be even more variable than it is now, when a higher or lower yield tends to be offset by a lower or higher price. Price stabilization alone is therefore no guarantee of stable incomes.

Disposing of Surplus by Export Dumping

Up to this point only year-to-year storing has been discussed, and the estimates have indicated that the advances in prices which could be secured by that method may quite likely be much less than has usually been taken for granted. We may therefore take up another method that has been proposed—export dumping. If the supply of a homogeneous product exceeds domestic takings by even a small margin, that entire supply will tend to sell on the world price level, in spite of the existence of a tariff. Export dumping has been suggested as a remedy, to force into export enough of the supply so that prices to the domestic consumers would tend to be maintained at the tariff differential above the world level, while the "exportable surplus" was sold on the world market. Such export dumping can probably be secured most simply by paying exporters a bounty equal to the tariff on each unit of the commodity they export. Whether these bounties are in the form of export debentures, to be applied on import duties, or whether they are paid in cash from public funds, or whether assessed against farmers, the economic principles involved are largely the same. The analysis that follows is therefore directed to the general problem of estimating the probable results of export dumping, no matter which method would be used.

The questions that need to be answered in working out the estimates are as follows:

(1) How far could domestic prices be raised above prices on important foreign markets under the present tariffs?

(2) How much reduction in domestic consumption would probably be caused by such an advance in price?

(3) How much reduction in world prices would probably be caused by increasing our exports enough to offset this decreased domestic consumption?

(4) What would be the estimated income to farmers at the new domestic price, established at the tariff differential above the new world price level, compared with the income at the domestic price level which would otherwise prevail?

(5) What would be the estimated costs of dumping, through payment of export bounties? (I am ignoring here the further question as to what it would cost to put the operations into effect.)

(6) How would the estimated increased returns to farmers, if any, compare with the costs of the export dumping?

The results obtained by working out these questions will be illustrated for two commodities. The caution mentioned earlier, that more exact knowledge of the effects of supplies upon price and of prices upon consumption might materially modify the conclusions, applies with equal force here.

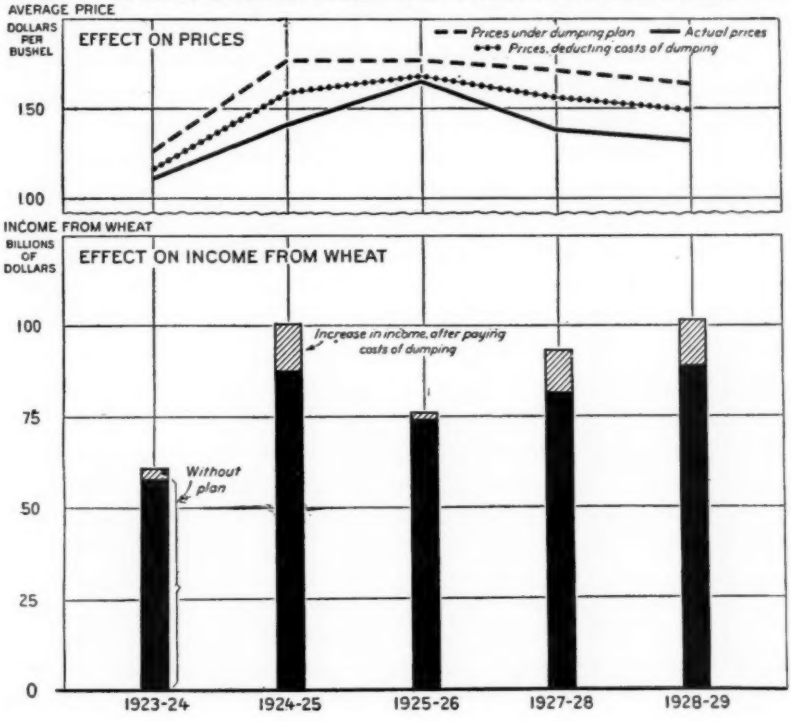
Export dumping of wheat

Wheat is a difficult commodity to work with since sometimes we are on a domestic basis for one type of wheat at the same time we are on an export basis for another. This analysis is limited to two types of wheat, hard spring and hard winter. The extent to which export dumping might have raised prices in the past was estimated for spring wheat by comparing the monthly prices at Minneapolis with those at Winnipeg, and for winter wheat, by comparing monthly prices at Kansas City with corresponding prices at Liverpool, for the past five crop years. In some months the tariff was fully effective, so no further advance could have been secured by dumping; in other periods our prices were depressed below the exporting basis, and an advance of even more than the tariff might have been secured.

The conclusions from the study of dumping wheat are shown in Figure 6, with the prices for both types lumped together. In every year farm prices and farm incomes from wheat would apparently have been increased, the ad-

vance in price varying between 12 cents in 1925 and 15 cents in 1923, when spring wheat was nearly on a domestic basis anyway, to as much as 33 cents in other years. To secure these advances, annual exports would have had to be increased by as much as 43 million bushels. The increased exports, being very small in comparison with world exports of wheat, would have had only a negligible effect upon the

FIG. 6 EFFECTS OF EXPORT DUMPING ON WHEAT PRICES AND VALUES



world price level, the maximum reduction in world wheat prices, 2.4 cents, coming in 1927. The payments of bounties on the exports for individual years would have varied between 50 and 120 million dollars. Had this cost been charged back to the farmers, it would have varied between 5 and 18 cents on each bushel sold. Even after deducting this farmers would still have gained from 6 to 23 cents per bushel as a result of the operation of the plan, and had

production remained just as it was, farm incomes would have been correspondingly higher. In 1923, when spring wheat was almost on a domestic basis anyway, the advance in spring wheat prices would have been 5 cents below the pro-rata per-bushel cost, and in 1925 it would just have equalled it; but in all other years for spring wheat, and in every year for winter wheat, the increases in price would have exceeded the pro-rata share of the export bounties.[15]

Export dumping of cotton

When the same analysis is applied to other products, a different situation is found. In the case of cotton, for example, we usually export about half of our crop. If we placed a tariff on cotton and paid a bounty to increase exports, the total cost of the bounty on the portion exported would probably equal the total increase in price on the portion consumed in this country, even if there were no change in the world price level. But our supplies of cotton dominate the world market, and the increase in exports would undoubtedly reduce the world level of cotton prices, perhaps reducing foreign cotton prices nearly as much as it raised domestic prices above them. For these reasons it is very clear that export dumping of cotton would be a profitless operation at the best, and would very probably cost much more in export bounties than it would increase returns to producers.

Export dumping of hog products

To apply export dumping to hogs we must consider separately the important products exported. With lard, we ordinarily export about half of our production, while with hams, bacon, and shoulders we export between one-sixth and one-third of the production. In both cases, however, our exports occupy an important place in the world market, so that the effect of any increase in our exports upon the world level of prices must be taken into account.

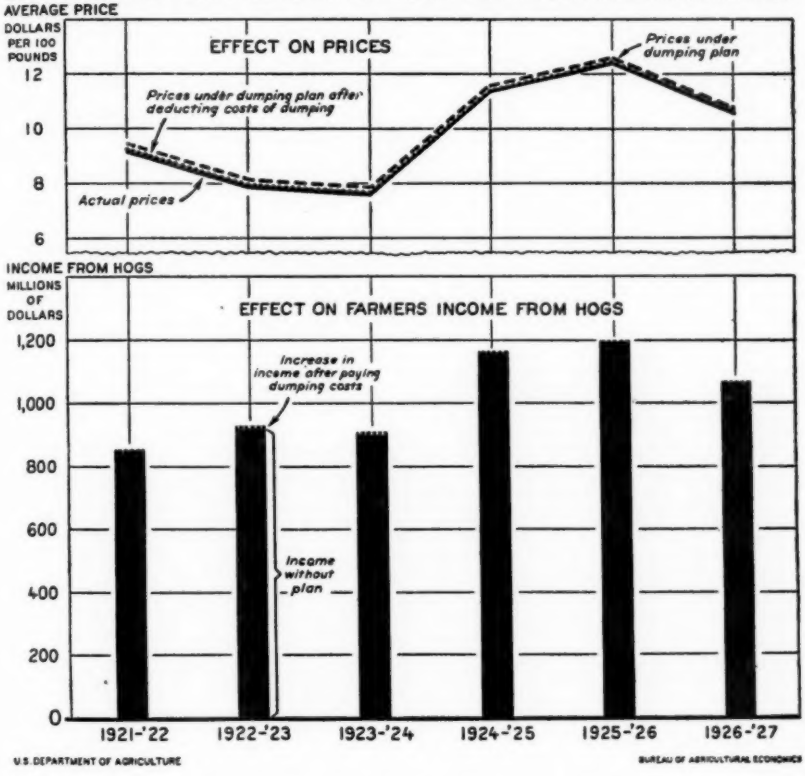
Working out the same analysis for these products as has been described in more detail for wheat, the conclusion is reached that export dumping of lard would have cost al-

[15] The detailed computations are given in Tables 11 to 13.

most as much in bounties in every case as the increase in the total value of the product sold for domestic consumption. With hams and shoulders, on the contrary, there is a slight gain even after deducting the costs of the bounties. Assuming that all of the increased value of the products were carried back into the prices of the hogs slaughtered (as

FIG. 7

ESTIMATED EFFECTS OF EXPORT DUMPING ON HOG PRICES AND VALUES



studies of hog prices indicate that it would tend to be) the average prices paid for hogs by packers would be advanced to the extent shown in Figure 7. The increases are quite modest, varying from 17 cents per hundred pounds to 34 cents. If the cost of the export bounties were paid by farmers, the increases in price would range between 3 and 7 cents per hundred pounds. As is shown in the lower part of Figure 7 these increases in prices, after deducting costs, are so

modest that the net increase on farmers' incomes from hogs would be only 9 million dollars for 1922, the most successful year. The tariff on these products is only 2 cents per pound, however; if the tariff were higher, slightly better results might be secured.[16]

Export dumping of other products

Butter is one commodity which has been at times in a peculiarly favorable situation for export dumping operations. We are now on a domestic basis, but by only a narrow and precarious margin. It would take only a relatively small increase in production to put us on an exporting basis during part of the year, and to cause dairy farmers to lose much of the higher price they now enjoy because of effective tariff protection. At such times a relatively small exportation of butter would be sufficient to correct the situation, and maintain the domestic price above the world price level. Such exports would have no appreciable effect on world prices, in comparison with the large international movements of butter, so there would be every chance for the operation to prove successful.

Conclusion

Before summarizing these various estimates it should be noted again that the effect of the new price changes on subsequent production has been ignored in every case but one. With wheat, for example, the gains secured by export dumping could not be long maintained if considerable increases in acreage resulted from prices maintained well above the $1.50 level. If export dumping prevented a surplus production of butter from depressing prices, production might be still further expanded until at last not even that device could longer maintain prices. The mere fact that wheat and butter prices would be the only major commodities whose prices would be perceptibly advanced by the dumping operations, while prices of other products would be left substantially as they were before, would almost inevitably tend to cause such an increase in the pro-

[16] The conclusions are based on preliminary studies of the relation of wholesale product prices to apparent consumption of the several products within this country, and on studies of the effect of export prices on the exports of ham, bacon, and lard. Table 14 and 15 summarize the computations.

duction of those favored products as to depress their prices in spite of dumping, and leave producers even worse off than they were before. So in spite of the apparent gains to be made by export dumping, it is doubtful if it offers much hope of proving a long-time solution to the problem.

A further point with respect to export dumping is seldom frankly faced: the only way that prices would be raised by such operations would be by raising the price to domestic consumers. Further than that, in order to dispose of the increased exports, the entire quantities exported would be sold to foreign consumers at lower prices than they would otherwise pay. Even if the costs of the export bounties were deducted from the increase in prices to farmers, the cost to American consumers would still exceed the net gain to farmers by whatever loss the lower world price occasioned on foreign sales. Consumers could pay taxes to give farmers a direct subsidy on their production equal to the amount they would gain under the dumping plan, at less cost to the consumers than the costs under export dumping, since by a direct subsidy they would only be paying what the farmer received, while under export dumping they would be paying for what the farmer gained and also for what the foreign consumer of the product saved.[17]

It must be emphasized that none of this discussion applies to what might be termed the institutional side of the proposed measures for farm relief. If the new agencies should succeed in making cooperative selling stronger and more effective, they might save for the farmers some of the present costs or wastes in marketing. Furthermore, if they secured better direction of production, that would also tend to increase returns. But both these possibilities are outside my thesis. I am simply examining the possibilities of success in carrying out certain types of market operations which have been suggested as means of handling annual surpluses, and nothing more. The estimates which have been presented indicate that the increases in returns to farmers which could be secured by the various methods of

[17] This same objection, however, may be raised against effective protective tariffs. Consumers pay both the tariff on the quantity imported, and a subsidy equal to the tariff rate to the domestic producer.

disposing of annual surpluses which have been discussed may quite possibly be much less than has been currently assumed. Particularly if the gains are spread out over the prices for the entire period of assumed operations, the relatively small increase shown by the estimates is apparent.

Such year-to-year storing as has been described would apparently have had relatively little effect on average prices to producers even if production continued unaffected, raising the average price of wheat by but 4/100 of one cent per bushel, and of cotton by but one-third of a cent per pound. When the costs of the operation are considered, there are

AVERAGE PRICES FOR PRODUCTS, UNDER DIFFERENT METHODS OF DISPOSING OF ANNUAL SURPLUSES

Method	Crop	Period	Weighted average price for period[1]		
			Actual price	Price with plan in operation	
				Not deducting operation costs	Deducting operation costs
			Cents	Cents	Cents
Storing in low-price years; no effect on acreage	Wheat	1900–15, 1921–26	93.17	93.21	93.04
Storing in low-price years; no effect on acreage	Cotton	1900–13, 1920–27	14.88	15.22	15.23[2]
Storing in low-price years, with effect on subsequent acreage	Cotton	1920–27	20.62	20.20	20.12
Export dumping by paying bounties	Wheat[3]	1923–27	1.21	1.48	1.34
	Hogs	1921–27	9.69	9.92	9.74

[1] Prices are central market prices in each case, except where noted.
[2] In this case there would have been a slight net gain by the storing agency.
[3] These wheat prices are farm prices to producers.

losses for wheat instead of gains. Even if it be assumed that the storing agency were far-sighted enough to have stored only in those years when farmers would have gained as a result, and not to have stored in other periods—as when prices were low for two years in succession—these estimates indicate that this would have raised the average value of wheat by but 2/10 cents a bushel, even with the agency paying the costs of operation and absorbing the profits or losses.

The gain on cotton by storing is only if production continued unchanged. If it be assumed that farmers would continue to change cotton acreage in response to changes in cotton prices as they have heretofore, then the assumed

storage operations during the period 1920-27 would have reduced the average price of cotton to producers by 4/10 of a cent per pound, and in addition would have caused losses aggregating 45 million dollars on the stored cotton.

Export dumping of wheat, on the contrary, would have advanced wheat prices by 27 cents, on the average of the period studied, and by 13 cents even after paying the bounty costs—if it could be worked, and if production were not increased. For hogs, however, the effect of export dumping on the price at the best would be very small, raising the average price but 23 cents per hundred pounds, even without deducting the bounty costs.[18]

There is one additional method of treating the surpluses which depress prices below the profit line which has not been mentioned yet—and that is by not producing them. For example—in February, 1926, the U. S. Department of Agriculture's Outlook Report said, "A production (of cotton) from a yield somewhat larger than the five-year average (which includes the three lowest yields per acre in the last half century) on an acreage equal to that of last season, ... could easily result in a price too low to render a profit to large numbers of producers. Obviously the situation might be aggravated if the acreage were increased." Had farmers heeded that warning, and cut acreage instead of increasing still further, what would have been the result? If they had produced 20 per cent less cotton than they actually did produce in 1926, the crops would probably have sold for nearly 150 million dollars more than it did, judging from the prices for crops and supplies of different sizes in recent years. In addition, producers would have been saved the cost of plowing, planting, cultivating, picking, and ginning one-fifth of the crop. Even if only the actual cash expenses are counted, the cash expense of growing the crop would have been reduced by about 150 million dollars. Adding this reduction in expense to the increase in the value of the crop, there would have been a net gain of about 300 million dollars in cotton producers'

[18] These estimates are all tentative, of course, and may be modified by further study, so they are by no means final statements as to the possibilities of the several different methods.

incomes as a probable result had the 1926 acreage been reduced by 20 per cent.[19]

Similar possible gains through control of production might be pointed out for other products—potatoes in 1928, for example. In view of the relatively small gains which seem likely through storing, and the institutional, political, and international difficulties in the way of export dumping, it seems that the brightest hope for increasing returns to farmers lies in a better adjustment of production to demand. The State colleges and the Department of Agriculture are more and more directing their efforts to aid farmers in adjusting their production and marketing with regard to the outlook as to future demand, production, and prices. The problem now is largely one of extension—of bringing to the attention of farmers the information already being made available, and of getting them to understand what it means and how to use it in planning their own operations. Great progress is being made in the job of carrying the gospel of economic facts to farmers, and still more remains to be done. It does seem, though, that further development, localization, extension, and application of facts aimed at the proper direction of production, will in the long run prove to be the most effective means that can be used to "settle the farm problem."

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[19] For the future, of course, federal employes are enjoined by recent legislation against cotton price forecasting from issuing any such direct warning on cotton as that quoted.

TABLE 1.—WHEAT STORING; ESTIMATED EFFECT ON PRICE AND CROP VALUE, YEAR OF STORING

Crop year	Weighted actual average farm price[1]	Average farm price with storing	Quantity purchased by agency	Crop Value	
				No storing	Storing
	Cents per bu.	*Cents per bu.*	*Million bu.*	*Million dollars*	*Million dollars*
1906–07.....	71.0	81.0	75	538	613
1912–13.....	83.3	88.3	41	608	645
1913–14.....	79.3	84.3	45	605	643
1923–24.....	92.4	107.4	88	736	856

[1] Farm prices for 1906–07 estimated from weighted average market prices.

TABLE 2.—WHEAT STORING; ESTIMATED EFFECT ON PRICES AND CROP VALUES YEAR OF SALE OF STORED WHEAT

Crop year	Additional wheat to be sold[1]	Original farm price, no storing[2]	New price, storing	Crop value	
				No storing	Storing
	Million bushels	*Cents per bu.*	*Cents per bu.*	*Million dollars*	*Million dollars*
1907–08.....	55	91.5	82.2	584	524
1914–15.....	65	99.4	88.1	886	785
1924–25.....	47	127.8	115.8	1104	1001

[1] Change in U. S. wheat supply for year, due to agencies storing and reduction of storing by private speculators.
[2] Farm prices for 1907–08 estimated from market prices.

TABLE 3.—WHEAT STORING; ESTIMATED PROFIT OR LOSS TO STORING AGENCY

Crop year	Quantity stored	Purchase price, per bu.	Cost	Cost of storing		Total cost	Sale price, per bu.	Returns	Profit or loss
				Per bu.[1]	Total				
	Mil. bu.	*Cents*	*Mil. dols.*	*Cents*	*Mil. dols.*	*Mil. dols.*	*Cents*	*Mil. dols.*	*Mil. dols.*
1906–07...	75	81.0	60.8	.09	6.8	67.6	82.2	61.7	−5.9
1912–13...	41	88.3	36.2	.24	9.8	46.0	88.1	36.1	−9.9
1913–14...	45	84.3	37.9	.12	5.4	43.3	88.1	37.6	−3.7
1922–23...	88	107.4	94.5	.18	15.8	110.3	115.8	101.9	−8.4

[1] At 9 cents per year in 1906, 12 cents in 1912, and 18 cents in 1922.

TABLE 4.—WHEAT STORING; NET RESULTS OF STORAGE OPERATIONS, IN MILLIONS OF DOLLARS

	1906–1907		1912–1914		1922–1923	
No storing:						
Value of 1st crop	537.5		608.1		736.4	
Value of 2nd crop	583.9		605.1		1104.2	
Value of 3rd crop			885.7			
Total		1121.4		2098.9		1840.6
Storing						
Value of 1st crop	613.2		644.6		856.0	
Value of 2nd crop	524.4		643.2		1000.5	
Value of 3rd crop			785.0			
Total		1137.6		2072.8		1856.5
Gain to farmers		+16.2		−26.1		+15.9
Profit or loss to agency		− 5.9		−13.6		− 8.4
Net gain		+10.3		−39.7		+ 7.5
Interest (4%)		− 2.0		− 4.4		− 3.8
Gain above interest		8.3		−44.1		3.7
Gain or loss per bushel		[1]+ 0.6		[1]− 1.8		[1]+ 0.2

[1] Cents

TABLE 5.—COTTON STORING; ESTIMATED EFFECT ON PRICES AND CROP VALUES YEAR OF STORING

Crop year	Weighted New Orleans price	Average price with storing	Quantity purchased by agency[1]	Crop Value	
				No storing	Storing
	Cents per lb.	*Cents per lb.*	*Million bales*	*Million dollars*	*Million dollars*
1901–02	8.03	10.03	1.17	382	477
1902–03	8.68	9.68	.53	461	515
1908–09	9.26	10.26	.62	613	679
1911–12	10.16	11.16	.70	797	876
1920–21	18.60	20.60	.66	1,250	1,384
1921–22	17.91	18.91	.43	712	752
1926–27	13.78	16.78	1.34	1,239	1,508

[1] See tables 17 and 18 for economic basis of these calculations.

TABLE 6.—COTTON STORING; ESTIMATED EFFECT ON PRICES AND CROP VALUES IN YEAR OF SALE OF STORED COTTON, AND SUBSEQUENT YEARS

Crop year	Additional cotton in supply[1]	Original price, no storing	New price, storing	Crop value	
				No storing	Storing
	Million bales	*Cents per lb.*	*Cents per lb.*	*Million dollars*	*Million dollars*
1903–04	0.70	11.59	10.96	571	540
1904–05	.47	9.02	8.57	606	576
1905–06	.36	10.90	10.51	576	556
1906–07	.24	10.52	10.24	698	680
1907–08	.16	13.05	12.80	725	711
1909–10	.26	14.08	13.86	704	693
1910–11	.17	14.45	14.31	839	831
1912–13	.30	11.95	11.69	819	801
1913–14	.18	13.22	13.09	936	927
1922–23	.51	24.58	23.62	1199	1152
1923–24	.22	30.97	30.00	1570	1521
1924–25	—	23.84	23.84	1624	1624
1925–26	—	20.32	20.32	1636	1636
1927–28	.53	20.11	19.51	1286	1248
1928–29	.39	—	—	—	—

[1] Change in world carry-over of American cotton for the crop year, due to storing by the agency and reduction in storing by private speculators same year; and increased carry-over in subsequent years due to lower prices.

TABLE 7.—COTTON STORING; ESTIMATED PROFIT OR LOSS TO STORING AGENCY

Year of purchase	Year of sale	Quantity purchased	Purchase price	Cost of storing	Sale price	Profit or loss per unit	Total profit or loss
		Million bales	*Cents per pound*	*Cents per pound*	*Cents per pound*	*Cents per pound*	*Millions of dollars*
1901–02.....	1903–04	1.17	10.03	2.0	10.96	−1.07	−6.3
1902–03.....	1903–04	.53	9.68	1.0	10.96	+ .28	+0.7
1908–09.....	1909–10	.62	10.26	1.0	13.86	+2.60	+8.1
1911–12.....	1912–13	.70	11.16	1.0	11.69	− .47	−1.6
1920–21.....	1922–23	.66	20.60	3.0	23.62	+ .02	+0.1
1921–22.....	1922–23	.43	18.91	1.5	23.62	+3.21	+6.9
1926–27.....	1927–28	1.34	16.78	1.5	19.51	+1.23	+8.2

TABLE 8.—COTTON STORING; NET RESULTS OF STORAGE OPERATIONS (IN MILLIONS OF DOLLARS, EXCEPT NET GAIN PER POUND)

Item	1901–1907		1908–1910		1911–1913		1920–1923		1926—	
	No storing	Storing in 1901 and 1902	No storing	Storing in 1908	No storing	Storing in 1911	No storing	Storing in 1920 and 1921	No storing	Storing in 1926
Value of:										
1st crop.....	382	477	613	679	797	876	1250	1384	1239	1508
2nd crop	461	515	704	693	819	801	712	752	1286	1248
3rd crop.....	571	540	839	831	936	927	1199	1152	?	?
4th crop.....	606	576					1570	1521		
5th crop.....	576	556								
6th crop.....	698	680								
7th crop.....	725	711								
Totals.....	4019	4055	2156	2203	2552	2604	4731	4809	2525	2756
Gain to farmers.....		36		47		52		78		231
Profit or loss to Agency		−6		+8		−2		+7		+8
Net gain.....		30		55		50		85		239
Net gain, per pound cents.....		0.1		0.3		0.2		0.4		1.56

TABLE 9.—COTTON STORING; ESTIMATED EFFECT ON PRICE, CROP VALUE, AND PRODUCTION IN SUBSEQUENT YEARS

Year	Actual record				Estimated, with storage operations				
	Acreage	Production	Price	Crop value	Acreage	Production	Price	Crop value	Amount purchased by agency
	Million acres	*Million bales*	*Cents per lb.*	*Million dollars*	*Million acres*	*Million bales*	*Cents per lb.*	*Million dollars*	*Million bales*
1920–21...	35.88	13.44	18.60	1,250	35.88	13.44	20.60	1,384	0.66
1921–22...	30.51	7.95	17.91	712	33.04	8.61	18.91	814	1.04
1922–23...	33.04	9.76	24.58	1,199	36.61	10.82	20.34	1,100	—
1923–24...	37.12	10.14	30.97	1,570	35.99	9.83	26.07	1,283	—
1924–25...	41.36	13.63	23.84	1,624	39.41	12.98	24.46	1,587	—
1925–26...	46.05	16.10	20.32	1,636	43.90	15.36	21.46	1,648	—
1926–27...	47.09	17.98	13.78	1,239	46.63	17.81	17.78	1,583	1.57
1927–28...	40.14	12.96	20.11	1,303	49.61	16.04	14.93	1,197	—
1928–29...	45.33	14.37	—	—	43.90	13.94	—	—	—

TABLE 10.—COTTON STORING; PROFIT OR LOSS TO STORING AGENCY ON OPERATIONS IN TABLE 9

Year of purchase	Year of sale	Quantity purchased	Purchase price	Cost of storing	Sale Price	Profit or loss per unit	Total profit or loss
		Million bales	*Cents per pound*	*Cents per pound*	*Cents per pound*	*Cents per pound*	*Million dollars*
1920–21.....	1922–23	0.66	20.60	3.0	20.34	−3.26	−10.76
1921–22.....	1922–23	1.04	18.91	1.5	20.34	− .07	− .36
1926–27.....	1927–28	1.57	17.78	1.5	14.93	−4.35	−34.15

TABLE 11.—UNITED STATES WHEAT PRODUCTION AND EXPORTS, AND ESTIMATED EXPORTS WITH EXPORT DUMPING, 1923–1927

Crop year	Wheat production	Actual exports wheat and flour	Additional exports wheat and flour	Total exports wheat and flour	Reduction in world prices due to increased exports
	Million bushels	*Million bushels*	*Million bushels*	*Million bushels*	*Cents per bushel*
1923–24.....	797	124	22	146	1
1924–25.....	864	254	34	288	2
1925–26.....	676	102	7	109	0
1926–27.....	832	219	37	256	2
1927–28.....	872	207[1]	43	250	2.4

[1] Preliminary estimate.

TABLE 12.—U. S. MARKET PRICES OF WHEAT PER BUSHEL, AND PRICES ESTIMATED WITH EXPORT DUMPING, 1923–1927

Year and type of wheat	Average market price for season[1]	Estimated market price under plan	Cost of export dumping	Net increase above cost of dumping
	Dollars	*Dollars*	*Cents*	*Cents*
All wheat				
1923.....	1.11	1.26	10	+05
1924.....	1.41	1.77	18	+18
1925.....	1.65	1.77	9	+ 3
1926.....	1.38	1.71	15	+18
1927.....	1.32	1.635	14.5	+17
Hard red spring wheat				
1923.....	1.23	1.28	10	− 5
1924.....	1.56	1.89	18	+15
1925.....	1.66	1.75	9	0
1926.....	1.50	1.69	15	+ 4
1927.....	1.33	1.785	14.5	+31
Winter wheat				
1923.....	1.07	1.26	10	+ 9
1924.....	1.34	1.72	18	+20
1925.....	1.64	1.79	9	+ 6
1926.....	1.34	1.72	15	+23
1927.....	1.32	1.595	14.5	+13

[1] Prices are for No. 1 Dark Northern Spring at Minneapolis, and No. 2 Hard Winter at Kansas City, for the six months when the bulk of the crop is sold (August to January) weighted by marketings.

TABLE 13.—ESTIMATED CHANGE IN FARM VALUE OF WHEAT CROP, DUE TO EXPORT DUMPING, 1923–1927

Year	Estimated value of crop, at prices which actually prevailed[1]	Estimated value of crop, had plan been in operation		
		All wheat	Hard red Spring wheat	Winter and durum wheat
	Million dollars	*Million dollars*	*Million dollars*	*Million dollars*
1923	579	+ 31	− 9	+ 40
1924	877	+127	+32	+ 95
1925	743	+ 18	0	+ 18
1926	816	+120	+ 7	+113
1927	892	+125	+50	+ 75

[1] At farm prices.

TABLE 14.—EXPORT DUMPING OF HOG PRODUCTS; ESTIMATED EFFECT ON PRICES AND EXPORTS OF HOG PRODUCTS

Year Nov. 1 to Oct. 31	Effect of operations on lard				
	Without dumping			With dumping	
	Price	Exports	Domestic Price[1]	Export Price[1]	Exports
	Dollars per cwt.	*Million pounds*	*Dollars per cwt.*	*Dollars per cwt.*	*Million pounds*
1921–22	12.72	761	13.22	12.30	790
1922–23	13.60	1028	14.10	13.34	1052
1923–24	14.41	1027	14.91	14.15	1051
1924–25	17.85	725	18.35	17.42	753
1925–26	17.28	720	17.78	16.88	745
1926–27	14.01	695	14.51	13.63	717

Year Nov. 1 to Oct. 31	Effect of operations on hams and bacons, and shoulders				
	Without dumping			With dumping	
	Price[2]	Exports	Domestic Price[1]	Export Price[1]	Exports
	Dollars per cwt.	*Million pounds*	*Dollars per cwt.*	*Dollars per cwt.*	*Million pounds*
1921–22	30.72	584	31.62	29.61	603
1922–23	26.77	798	27.87	25.91	823
1923–24	24.49	707	25.59	23.61	732
1924–25	32.61	465	33.31	31.31	483
1925–26	37.77	378	38.37	36.26	393
1926–27	30.85	260	31.35	29.25	273

[1] The computations were not carried to the point of securing absolutely the exact tariff differential
[2] Average of prices on bacon and ham.

TABLE 15.—ESTIMATED COST OF DUMPING HOG PRODUCTS AND EFFECT ON VALUE AND PRICES

Year Nov. 1–Oct. 31	Export bounties	Increase in value of products		Prices of hogs[1]		
		Total	Subtracting bounty cost	Actual[2]	With export dumping	
					Not subtracting bounty	Subtracting bounty
	Million dollars	*Million dollars*	*Million dollars*	*Dollars per cwt.*	*Dollars per cwt.*	*Dollars per cwt.*
1921–22	20.0	24.3	+4.3	9.15	9.41	9.20
1922–23	27.0	34.2	+7.2	7.87	8.16	7.93
1923–24	25.2	34.1	+8.9	7.58	7.87	7.65
1924–25	17.2	21.4	+4.2	11.30	11.51	11.34
1925–26	15.3	18.3	+3.0	12.37	12.56	12.40
1926–27	12.6	17.3	+4.7	10.57	10.74	10.60

[1] Assuming entire increase in value of the products was carried over into prices of live hogs.
[2] Average cost of hogs purchased by packers reporting to the Bureau of Agricultural Economics.

TABLE 16.—BASIC DATA FOR COTTON STORAGE COMPUTATIONS

Crop Year	Trend of supply[1]	Trend of carry-over end of season[2]	Weighted av. price at New Orleans
	Million bales	*Million bales*	*Cents per pound*
1900–01	—	3.51	—
1901–02	13.6	3.63	8.03
1902–03	14.0	3.75	8.68
1903–04	14.5	3.88	11.59
1904–05	15.0	4.01	9.02
1905–06	15.5	4.15	10.90
1906–07	16.0	4.30	10.52
1907–08	16.6	4.47	13.05
1908–09	17.2	4.59	9.26
1909–10	17.6	4.71	14.08
1910–11	18.3	4.87	14.45
1911–12	18.9	5.07	10.16
1912–13	19.5	5.24	11.95
1913–14	20.2	5.41	13.22
1920–21	16.1	4.30	18.60
1921–22	16.6	4.43	17.91
1922–23	17.2	4.59	24.58
1923–24	17.8	4.76	30.97
1924–25	18.4	4.91	23.84
1925–26	19.1	5.08	20.32
1926–27	19.7	5.26	13.78
1927–28	20.3	5.42	20.11

[1] World carry over Aug. 1 plus new U. S. Crop, final figure.
[2] World carry over of American cotton, Aug. 1, end of season.

TABLE 17.—ANALYTICAL BASIS FOR COTTON STORAGE COMPUTATIONS; RELATION OF PRICE TO SUPPLY, TO CONSUMPTION, AND TO SUBSEQUENT CARRY-OVER

Weighted av. price for season[1] cents per pound	World supply to set that price in per cent of trend	World consumption at that price in per cent of trend of World Supply	Carry-over at end of season with that price in per cent of trend
32	73.8	57.1	63.0
30	76.7	59.6	64.1
27.5	80.0	62.5	66.0
25	84.5	66.1	69.2
22.5	91.9	70.9	76.5
20.0	101.8	74.5	102.5
17.5	111.4	77.3	128.0
15	121.0	79.9	154.0
12.5	130.2	81.4	180.0

[1] Prices adjusted by dividing by Bureau of Labor Index of Wholesale Prices, with 1913 = .667. (Adjusted to approximate price-level in recent years.)

PROSPECTIVE DISPLACEMENT OF THE INDEPENDENT FAMILY FARM BY LARGE FARMS OR ESTATE MANAGEMENT, AND THE SOCIO-ECONOMIC CONSEQUENCES

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This topic as I interpret it raises the question whether distinctly large-scale farming and estate management is in prospect as the prevailing type of business organization in agriculture. Is it really coming? If so, how soon? To what degree will it take over the whole industry? Under what farming conditions and in terms of what type belts, and regions will it find its place? How soon is the development to take place. By what processes of change and reorganization will it be brought about?

But by implication this topic goes deeper than these surface inquiries. It raises the whole question of the significance of entrepreneurship in solving the problems of the future of our agricultural industry. It involves also the task of forecasting the probable effect of such developments as may be foreseen, on the future economic and social status of the agricultural class and the future relations of agriculture as an industry to the other fields of economic activity.

The task is a precarious one, as is true of all prophesying. One runs a major chance of misjudging the significance of most of the conditions and forces now at work. If he is right, some economic historian of the future may name him as a seer. If wrong, the best he can hope is that his prophesy may be forgotten and not held against him.

Notwithstanding these hazards, the task is one that we cannot shirk. In these years of bewildering economic change, one of our chief tasks is to forecast as best we can probable future developments. The historical school of economic thought can no longer justify itself by the mere classification and interpretation of past events and movements. It must furnish guidance for future action.

This paper was read at the nineteenth annual meeting of the American Farm Economic Association at Chicago, Illinois, December, 1928.

In this paper then, the attempt will be made to evaluate the factors involved in the present-day status of farm proprietorship in the United States and the forces at work in agriculture with a view of drawing something of a pattern of the probable future development of entrepreneurship in our agriculture.

Entrepreneurship in Agriculture

It will be useful to begin this analysis with a consideration of the significance of the proprietorship function in agriculture. It is remarkable, to say the least, that in the eight years of feverish thought and discussion on our agricultural situation, so little attention has been given to this important aspect. Farm leaders practically without exception have focused their efforts entirely on legislation and other measures directed at price enhancement as the solution of the present unsatisfactory situation. To the extent that they have given any attention at all to proprietorship, it has been purely in terms of technical efficiency. It is a comomn declaration among them that the farmer has achieved a very high degree of technical efficiency. Indeed, it is asserted, quite without foundation, that he is too efficient, and that his efficiency has greatly aggravated his present economic difficulties.

On the part of the economists, there has been given a commendable degree of attention to the collecting and disseminating of economic information for the guidance of farmers in the exercise of their managerial function, but even here the tendency has been to prescribe lines of collective action rather than to encourage the exercise of real entrepreneurship on the part of individual farmers. Even after giving due credit to all of the effort devoted during the last ten years to the problem of forecasting and its related activities, it is likely that the major interest even of the economists has centered on the price problem, signifying their confidence in better prices as the basis for returning prosperity. This motive has been largely back of the keen interests of economists in the shift of men out of agriculture into industry.

It is worth considering whether the agricultural prosperity which comes as a result of rising price levels can be a sound and permanent prosperity. Such prosperity as American agriculture enjoyed between the disastrous depression of the '90's and the recent one was built primarily upon the basis of rising prices due primarily to a growing relative scarcity of agricultural products, combined, to be sure, with a rising general price level. While this movement enabled the farming people generally for practically a whole generation to enjoy a rising standard of living, it brought with it developments which were largely responsible for the severity of the recent depression. Conspicuous among these developments was the overcapitalization of agricultural resources, particularly of agricultural land. Closely related to this was the lack of emphasis upon low-cost production and the building up of a permanent type of agriculture. The agriculture which developed during this supposedly prosperous period was primarily exploitive rather than conservative and constructive.

Some comment of a rather obvious nature relative to the present status of entrepreneurship in agriculture is in order at this point. It is well known that the present small scale of business organization existing in agriculture means a maximum percentage of all those engaged in agriculture having managerial functions. In the northern part of our country at least one man in three gainfully employed in agriculture is to a limited sense, at least, a business proprietor. In other words, he is a farmer having the responsibility for controlling the use of a limited body of agricultural resources.

The inevitable concomitant of such an adjustment as this is a very low level of the average quality of entrepreneurship within the industry. There is practically no such thing as a specialized class of administrative talent engaged in agriculture. Its resources are in the control of a worker-proprietor class. This adjustment means that only incidental attention is paid to the important job of the administration of resources and the quality of this administration is so mediocre that only a relatively low utilization is realized.

Obviously agriculture stands in need of a higher grade of talent in the administration of its resources. Many things up to this time have stood in the way of the development and the employment of a higher class of entrepreneurship. We may well raise the question as to whether the time has now arrived for a fundamental change in this particular. Is agriculture ready for it? Are the barriers in the way of its coming not too great to permit this sweeping change? More pertinent to the subject before us, we may ask whether this change when it does come will be brought through the medium of large-scale farming? Is this the best way to get it? Are there other means of meeting this important need?

Technical Developments in Agriculture

No adequate consideration of the problem in hand can be had without giving consideration to the current developments in agricultural technique. It seems characteristic of periods of depression that they give stimulus to invention and bring forth new and more effective means and methods on the physical production side. This is particularly true of the present developments in agriculture, in spite of the fact that popular attention has been drawn almost entirely toward means of price enhancement rather than toward increased efficiency in production.

The most conspicuous development of this nature in the field of agriculture is taking place in the field of farm machinery. Most remarkable progress has been made during the last ten years in developing and perfecting new types of machines. The tractor, the combine-harvester, the cotton-harvesting sled are outstanding examples of this development. Several of them have brought with them the readaptation of other machines embodied in new types and new sizes. This development has been so conspicuous and so marked that it has caught the attention of the general public and has caused, particularly during the last year, a great deal of speculation as to the far-reaching economic effect of these improvements. They are in the way of introducing a fundamental change in farming methods involving a vastly greater application of power in farm operations.

The significance of these improvements in connection with the present problem is, first, in their ability to increase the capacity of the individual laborer, for machines, power, and land; and second, in increasing the necessary capital endowment for carrying on a well-rounded production unit under the methods made possible by these new machines.

Another development possibly quite as significant as the growth in machinery design is the progress that has been made in the further application of science to farming. Significant progress has been made in the application of genetics to crop breeding, and in the application of chemistry and physiology to the scientific feeding of animals. A third field of important development is the growth of the effectiveness of soil science in its practical application to the problem of building up and maintaining soil fertility on our best agricultural lands where, at the time of the depression, the effects of exploitive culture had been making themselves felt in an unmistakable way. These things have vast potentiality in terms of larger-scale farming and a new era in agricultural method and organization. Of great significance in this connection is the fact that they require proprietorship of a higher type than is now prevalent to realize their maximum effect in the way of a more profitable and well-rounded agriculture.

Closely related to the foregoing lines of development is that of the work of economists in attempting to analyze the forces determining the prices of agricultural commodities. Business forecasting for the farmer has received a major amount of attention during these years of agricultural depression. While its possibilities have been only partially grasped as yet, and use is being made of it by the ordinary farmer in almost negligible degree, yet it must be said that it has untold possibilities for the economic-minded farm proprietor who has sufficient time free from physical labor and other duties to give it ample consideration and to apply it to the problems of his own business.

The fundamental significance of all these things is to magnify the importance of highly intelligent and forceful proprietorship. Only under such leadership can the full effect of these recent developments be realized. The essen-

tial question is, how strong a force will these things be in the direction of bringing in the larger business unit as the prevailing type of farm organization?

Economic Effects of the War

Still another group of considerations needs to be brought into the picture. This group consists of some profound economic changes which have come about directly or indirectly from the Great War and its consequences and which have important bearing on the problem in hand.

The first of these was caused by the inflation and deflation incident to the war and the consequent rapid increase in the price of land with the accompanying increase in sales and expanded use of land mortgage credit. These things have resulted in an abnormal amount of liquidation of investment in farm loans reflected in a large amount of foreclosures and forced sales of land.

This movement, of course, has been accompanied by an abrupt drop in the price of land itself. Considerable amounts of land have been forced upon the market by this liquidation process. A considerable additional amount is in weak hands and presumably will be offered for sale within a short time. This has come to be called "distress" land. There is a pretty general assumption that the condition of the land market thus induced offers an unusual opportunity for the concentration of farm ownership and hence presents an encouragement for large-scale farming. At the same time the lowered purchasing power of the actual farming class is assumed to render impossible the general purchasing of this land by actual and would-be small operators. It is generally assumed that the events of the last ten years have greatly accelerated the elimination of the small owner-operator and gone still further to set the stage for large-scale operation. It is further assumed that the owners of large amounts of capital have been and will continue to seize this favorable opportunity to buy land.

Another economic factor growing immediately out of the war and postwar developments is the phenomenal growth in the volume of American capital. This is evidenced by the tremendous expansion of our foreign loans and the no

less remarkable increase in the capitalized value of American industrial and commercial enterprises. It is assumed in some quarters that this condition will in itself be a potent factor in promoting large-scale farming. This abundant capital means a keener search for capital employment. To such fields as transportation, manufacturing, mining and trade, which have occupied American capital up to this time, may be added the new industry of farming on a capitalistic basis. The probable extent of this is a question which must be considered in evaluating the forces which may in the future give us at least a larger degree of this particular type of farm business organization.

Present Extent of Large-Scale Farming

Our next inquiry has to do with the present extent of large-scale agricultural operations. What has been the history of this type of business unit in agriculture and what is its present status?

This is no new development in the southern part of the United States. Almost from the beginning of agricultural operations, cotton-growing was characterized by a high percentage of large-scale operation. The plantation system developed it first under the slavery régime. It underwent a fundamental change with the abolition of slavery. The first attempt at economic reconstruction was made on the basis of hired labor with the freedmen as employees. This proved unsuccessful and led to the development of share labor, the cropper system, and other forms of profit-sharing labor payment representing various degrees of share tenancy. Under all of these methods of compensating labor, the fundamental economic unity of the large holdings was maintained. A high degree of control on the part of the owners of the land has characterized all of these stages. It is true that in many parts of the South there are numerous independent small holders, either renters or owners, but the large-scale farm unit, operated under various adjustments as to labor, has up to the present moment held a large place.

Various examples of this same thing are available, particularly in terms of history, in other parts of the country.

Both North Dakota and the West Coast States had their periods of bonanza farming, which was essentially the factory idea applied to the farm so far as technical limitations permitted it to be applied. Almost universally this system began in the pioneer stages of agricultural development in the regions where it had a significant place. Almost universally also, it failed to withstand the competition of small holders in the stages of advanced development of agriculture in the several regions. However, this type of organization has left its imprint on these regions in terms of rather large individual farms and the occasional survival of a modified type of estate management.

Added to these cases, are the occasional large estates created in the early days of cheap land, and persisting up to the present, where some far-seeing and, usually, wealthy individual invested in thousands of acres of our best land and his descendants have been able to keep the estate more or less intact to the present. Operation of these holdings for the most part, however, can hardly be said to exemplify large-scale or collectively-managed farms. For the most part, the land has been farmed by tenants having a rather high degree of independence in the actual determination of the form of their farm organization and in carrying through its operation.

Another angle from which to examine this thing is with reference to the tendency in the size of all farms as reflected by census data. Here we find some evidence of the appearance of large-scale operation in terms of the growing importance of the larger farm. The census shows that between 1910 and 1920 there was a general tendency toward smaller units in the eastern half of the country, and an unmistakable tendency toward larger units in the western half. This is reflected by the significant increase or decrease in farms of a thousand acres or over. This has been brought about through the consolidation of small holdings. The most conspicuous development of this sort has taken place in Kansas and other portions of the Wheat Belt where the combine-harvester has forced it, and in Montana and other more newly homesteaded areas where the consolidation of the original settlers' holdings brought about a very

rational adjustment toward larger holdings under dry-farming conditions. Countervailing this, of course, is the movement toward smaller holdings in the cattle grazing industry through this whole region.

Strange to say, the 1925 census shows a decrease in the number of these large farms except in the Mountain division. We know, however, that in limited areas farms have increased greatly in size.

One of the developments of the last eight years which has attracted a great deal of popular attention is the measures taken to handle the land which has gotten into the hands of the banks, insurance companies, and other large credit agencies. Most of these institutions are unwilling owners. They have been forced to foreclose to save their investments. Many of them have employed agents whose special task is to look after these farms. Very little in the way of concentrated operation has developed as a result of this. These agents, for the most part, are mere rent collectors.

Still another development of this period which may be destined to be of great significance is the development of the so-called farm-management service idea, by which a degree, at least, of organizational and managerial functioning is furnished to the owners of land on the fee basis. More will be said with reference to these developments later on.

Probable Extent and Nature of Future Development

We cannot well further postpone the interpretation of conditions and forces already listed in an attempt to appraise the trends and possibilities of large-scale farming and estate management which is the task of this paper. Let us, then, take up in order the important factors in the case.

Calling up first the question of the liquidation of farm ownership as a result of the over-use of mortgage credit, we raise the question of what the new owners of this land are doing and what they can do. We can say with assurance that they are not throwing their land upon the market. These credit agencies almost universally are planning to hold the land for better prices. This does not mean that

they will hold it indefinitely, nor that they are expecting anything like a return to boom-time values. However, they hesitate to throw it upon an already demoralized market, and they cling to the hope that in a comparatively few years, the market may so improve as to enable them to get their original investment from this land.

But can we look to these institutions to develop an actual farm operating enterprise? It seems hardly likely. In fact nearly all the factors appear to be working in the other direction. As already indicated, they are appointing special employees to look after this land, take care of the improvements, add a limited amount of investment in the way of making these holdings appear more attractive, and, most important of all, set up and maintain the best possible landlord and tenant relations. In few cases are these agents actually exerting a great deal of influence on what the farming is actually to be, nor are they able in most cases, except through a wise selection of tenants, greatly to increase the degree of efficiency with which the farms are operated. All the circumstances are against it. In the first place, from the very nature of the function of these institutions, they cannot well invest capital in the livestock and equipment necessary to build up a farming business. In the case of the banks, the laws of many States actually forbid this sort of use of bank capital. Further, their holdings are scattered widely. It is not feasible to set up the close entrepreneural supervision over their operation which would be necessary for the establishment of centrally-controlled farm operations. Little, therefore, can be expected of this particular class of our new landlords in the direction of actual farming business.

What, then, of the other news owners of land, the many individuals of small means, who, either as speculators or retired operators, sold land, and now find it back on their own hands? Many of these owners are in economic distress and must sell the land in order to save any portion of their original investment. The land owned by this class of people constitutes the actual supply of "distress" land. In most areas it does not represent a very high percentage of the total land area. It is badly scattered, and therefore

does not offer an opportunity for the occasional capitalist who wishes to buy a group of small farms for consolidation. Only in rare cases is there an opportunity to buy a contiguous tract large enough for large-scale farming. There have been a number of sporadic cases of promotion based on this type of land. Groups of people have sought to enlist the interest of capitalists in this alleged opportunity, but for the most part the attempts have been failures. It should be said that for the most part also, these have been specultative attempts; that is, they had for their objective realization on the future increase in land value rather than the making of profits from actual operation. The land market has appeared so unpromising up to this time that most of these efforts have met with failure.

Growth in National Capital

Attention has been called to the phenomenal growth in the volume of American capital and the question raised as to its significance in the growth of large-scale farming. Obviously the effect will depend largely on the disposition of the owners of this capital to recognize and grasp any potential opportunity that may exist for the profitable employment of this capital in the agricultural industry. It is unlikely that the canny owners of American capital are going to invest in land at exorbitant prices. They are going to be sure that they are getting land at a low enough figure to eliminate practically all of the speculative element in value. As already pointed out, the opportunities for bargain-counter purchases of land are decidedly limited. Purchases would have to be made at fairly high prices as measured by the present land value levels. That is, of course, on the assumption that capital organized for this purpose would seek land in units relatively closely situated for convenience in administration. In this the would-be purchaser must meet the determined resistance of the small holder and in most of our agricultural areas the small holder is still a large factor. The great bulk of our owner-operated land is held in small tracts representing the family farm. Since this is well over 50 per cent of our area, the tenacity with which the small land holder traditionally clings to his hold-

ing, will be a significant barrier to securing the land basis for such units.

Further, we may well raise the question as to how readily and generally the owners of large blocks of capital drawn from non-agricultural industry are going to recognize a real opportunity for profitable investment and operation in the business of farming. In the opinion of the writer, they will be very slow. It is too new a problem for them. Too much organization effort is necessary to bring into being effective going concerns on this large scale. The promoters of these businesses will find a task which will tax their utmost ability. Capitalists are unfamiliar with agriculture, and it is likely that for a considerable time to come they will prefer to send their money abroad in foreign loans or to invest in our rapidly growing industrial enterprises even at comparatively low rates of return.

This growing volume of American capital should, however, constitute an important source of credit for such businesses if they are properly organized and the proper credit institutions are set up by which this surplus capital from industry can be drawn upon to supply the needs of a new type of business organization in agriculture.

Relative Advantages of Large-Scale Farm Organization

In the popular discussion of this problem much has been said of the advantages that large-scale organization has over the smaller farm unit. Let us examine this for a moment.

The advantages of large scale operation in industry have long been recognized, and are very real. The whole history of industrial development bears witness to the efficiency of large-scale operation. Many have judged, without adequate consideration of the peculiar nature of agriculture, that this unmistakable advantage is to be gained in equal measure in agriculture, if only the organization of large-scale units can be achieved.

The sources of gain from large-scale operation in industry are largely from saving in fixed charges or overhead, and the advantages of large-scale purchasing and selling. Perhaps more fundamental than this is the fact that truly

great entrepreneural talent is extremely limited. Only a few great business personalities appear in a generation. It is the prowess of these men, probably more than any other advantage, which is responsible for the giants in industrial and commercial organization which have appeared in the last few years.

However this may be, the unmistakable advantages of large-scale operation which do appear in industry are possible through the technical nature of non-agricultural production. It is characterized by a high degree of continuity in the operations, and by concentration of the working force and other resources in small physical compass. Both of these things make possible minute specialization of function and a high degree of division of labor. These things in turn make for a very high capacity on the part of the managerial and administrative personnel.

Those who know agriculture most intimately are aware of the strict limitations to the advantages given by these things so far as agriculture is concerned. Here again, the technique of the industry is the key. Practically all tasks in agriculture are seasonal in nature. There is lack of concentration of the working force. The consequence of these things is that there can be no very minute division of labor, there can be no continuous operation so far as any given set of tasks is concerned, and for these reasons the capacity of the managerial and administrative personnel is normally very slow.

There are no doubt many savings which can be made by the large-scale farming unit, impossible to the smaller unit, in terms of a more complete utilization of certain parts of the plant and a more complete employment of the proprietorship in strictly entrepreneural functions. But nothing closely analagous to the situation in industry can be made to obtain.

The nature of farming tasks will always dictate placing a large degree of responsibility in the individual worker. It is impossible to make him a cog in a vast machine as has been done with the industrial worker. The transfer of skill and thought from the laborer to the machine, which has figured so importantly in modern industry, is not pos-

sible to any large degree in agriculture. These things constitute the fundamental reason for the persistence of the family farm. Any scheme for increasing the size of the production unit in agriculture must recognize this fundamental consideration or be doomed to failure.

The recognition of this principle goes far toward revealing a principle or fundamental significance in successful large-scale farm organization and management. It is that the organization of the human element is the key to success and the secret to the peculiar technique of organization which must be developed if this large business unit is to find a place in farming. If agriculture through the new and larger business unit is to secure the services of superior administrative ability of the so-called captain of industry it must be organized to enlist on its side the will and the limited administrative ability of each and every worker under its control. Through some sort of distributive scheme the returns to the individual worker must be made contingent on his putting his personal forces, not only physical but mental, whole-heartedly into the common cause. Profit sharing, share-rental adjustments, bonus systems, or in many cases sheer skill and adeptness in personnel relations, seem to have been the secret of success in such cases as we already have of large-scale operation. No mechanical, impersonal system will work in agriculture. This is borne out both by reason and by the actual experiences of those who have already attempted this sort of farm organization.

A realization of this fundamental should be profoundly reassuring to those who fear the consequences of large-scale farming to the rank and file of agricultural workers. In view of it, the fear so often expressed that large-scale business units will condemn the actual workers to a life of peasantry is to say the least unfounded. The very life of such a system depends upon maintaining a high morale among the workers and it can scarcely be conceived to meet with lasting success unless it raises the economic and social status of its workers rather than lowering it.

A recognition of these relations raises the question of the significance of types of agricultural land and the types

of farming on the probable future development of large-scale operation in agriculture. In general, we can safely assume that this form of business unit will find its highest development under relatively simple types of farming. This is where we find it most successfully developed at present, as indicated by the growth of large farms in western Kansas and in the dry-farming sections of the Great Plains. Level, highly productive land, capable of maintaining through considerable periods an approach to a one-crop or one-product system, and which lends itself to large fields and large-scale implements and power units, will be best fitted for this type. The production of livestock, and of crops involving a high degree of skill, such as certain lines of horticulture, present a different farming problem, and one may well raise the question whether large-scale operation is going to have a conspicuous place in our dairy, truck, and fruit belts and in those regions of the Corn Belt where meat production is pursued under most intensive methods. Certain types of large-scale administration may possibly be set up here, but the handicaps to it are certainly greater than within our more simple types of farming. The greater detail in the labor program, the necessity of learning more highly-skilled operations involving a great variety of tasks, necessitate a close supervision of the workers and a high degree of responsibility on the part of the individual farm hand, thus limiting the capacity of the overhead administration.

Forms of Large-Scale Farming and Estate Management

The above discussion brings us to the question of the most likely type of large-scale organization. Thus far, there have appeared two general forms. The one is large-scale proprietorship on the basis of ownership of land and the ownership of all or a part of the other resources, operating either on the basis of hired labor or very closely supervised lease-hold. The second is organizational and managerial service under multiple ownership of land, for the most part on a rental basis.

The vast majority of present examples of large-scale operation are of the first sort. These had developed before

the present situation came. This particular form has not grown out of the new set of conditions and forces which have developed since the war. They have persisted from an earlier period and owe their origin to various forces and conditions originating in the past.

In the opinion of the writer, this form is not destined greatly to increase in number and importance. As already pointed out, the resistance to the securing of resources and the setting up of organizations of this sort are great. There is a possibility that to a limited extent present owner-operators may consolidate their holdings under a corporate form and thus secure the advantages of better management and large-scale buying and selling. Several instances or recent attempts at such organization have already come to light. However, the proverbial independence of the small-farm owner is likely to preclude any large development of this sort of thing within the near future.

The second form of large-scale administration, however, seems to have a considerable degree of significance in terms of present conditions. Small as is the place that it holds at present, it offers opportunity to the owner of rented land which he cannot profitably ignore. The developments such as we now have may be said to have arisen as a direct result of the new set of conditions and they seem to be meeting with marked success. This system is embodied in the so-called agricultural and managerial services which have been organized in recent years and whose function seems to be growing rapidly wherever it has been stablished upon rational lines.

In fact, it would seem that our rented land is the key to the future development of large-scale operation. We have long recognized the shortcomings of tenant farming under the American system. The vast acreage of American farm land now under lease constitutes one of our most acute agricultural problems. In the State of Iowa, according to the latest State statistics, 53 per cent of the farm land is now rented. The percentage of farms under lease for the country as a whole as reported in the 1925 census is 38.6. For the most part, this rented land constitutes the weakest sector in the agricultural front. The types of farming on

rented land reflects very serious maladjustments to the resources and to economic conditions; and the efficiency with which these resources are used is necessarily low. The margin of difference between the returns now being made upon rented land and those which might be made under a system of supervised tenancy which could really enforce scientifically efficient farming, is so great as amply to carry the expense of the necessary overhead administration and to leave a comfortable margin of return both to the tenants and to the owners of the land. Here would seem to be a field of activity for the new entrepreneur in agriculture. The need is great, and the difficulties of concentration of holdings and securing of farms in conveniently situated groups for the large units would seem much less serious than those encountered by the would-be organizers on the other basis. Such organization, universalized as it would seem that it may be during the immediate years ahead, would be a tremendous boon to the tenant class and to the agricultural industry as a whole.

Sources of Entrepreneural Talent

Of vital concern to the prospective development of large-scale farming and estate management is the source of entrepreneural service which this development will demand. Where are these super-managers to be found? Are they to come from the ranks of the present farming class? Are they to be derived from the broad group of agricultural college, experiment station, and extension workers including our county agents, or are they to be transplanted from industry to agriculture, bringing with them their qualifications and experiences from that field?

We can best throw light on this subject by discussing the qualifications which every man must have in order properly to function. In the first place, they must be good agriculturists. They must know farming in a technical way. Not only should they be thoroughly grounded in the scientific foundation upon which our highest and best agricultural technique is built, but they should be versed in the art of farming. That is, they should be able intelligently to judge actual farm practice and to see that the best

technique is put in operation upon the land for which they are responsible. Specifically, they should know the principles of chemistry, bacteriology, and physics involved in an understanding of soils and their management. They should be conversant with all of the practical phases of the soil problem in their particular region. The same should be true with reference to their ability as crop and livestock men.

In the second place, these agricultural proprietors should be thorough-going financial administrators. They should understand credit institutions and their functioning as they affect agriculture and they should be capable of practical adjustment of themselves and their business to these institutions on the one hand and to the need and use of funds in their business on the other.

Another indispensable qualification is that these men be thoroughly familiar with current economic conditions and forces as these things affect the agricultural business. They should be conversant with price-determining forces in terms of ability to understand and utilize price forecasts in the current adjustment of their production programs and in the laying out of capital in productive resources.

Finally and most important, they will have to be good personnel men. I have already emphasized the key position of the human element in a successful and permanent development of large-scale farm operating. The man at the helm must possess not only the vision to conceive a practical working system of control in which his directive authority will properly and successfully articulate with the limited managerial functions which must be delegated to the working force, but he must have the peculiar personal qualities which will enable him to keep these adjustments intact and the whole machinery working in a smooth and effective way. The motive power in successful farm administration is the will of the proprietor. The ability to enlist with his will that of each and every individual worker is so rare as to amount to genius; and yet a reasonable approach to this is essential to success.

What of the training, the age, and experience of these men? In view of the list of qualifications already specified,

experience will have to figure pretty largely in their preparation and with this experience of course goes maturity. No owner of economic resources is going to put large amounts of them into the hands of immature and inexperienced men, regardless of their innate brilliancy, their formal training, or their promises for the future. It goes almost without saying, also, that the highly successful men of this sort will for the most part be agriculturally-trained men. Although this is not essential, our agricultural colleges certainly provide on the whole the best opportunity for the scientific and technical training which forms the necessary background.

For the rest, the quality of the experience and the conditions under which it is to be obtained are of vital importance. What course of apprenticeship should a young man looking forward to work of this sort have in order that he may best qualify? These are unanswered questions and ones with which we as agricultural economists should be vitally concerned. Those who are already successfully functioning in this capacity have for the most part an adequate educational background and in addition they have had an opportunity to develop themselves and to demonstrate their ability for larger things through a considerable period of farming on a modest scale. Most of them are self-made in the sense that they have had no apprenticeship with other big agricultural business units. As time goes on, we may reasonably expect that a considerable number of such managers will be recruited from subordinates within the present and future existing establishments. To say the least, the present situation offers a challenge to those interested in the training of young men for agriculture. It certainly means that many of our agricultural college curricula should be overhauled and readjusted from the point of view of their fitness for the training of farm proprietors.

These considerations raise at least by implication the question of the small-scale owner operator. What is to be the ultimate status of this American yeoman class? There are, of course, a wide range of differences in our types of farming with reference to susceptibility to this large-scale type of organization. By the same token the future preva-

lence of large-scale operation will vary greatly from part to part of the country. In many regions as already hinted, the small-scale operator will remain in the ascendancy. In many other areas, also, even under conditions most favorable for large-scale operation, there is every reason to believe that the individual farm operator will maintain an important position. This is particularly true if the competition of the large unit for farm land the other resources spur him on to become as efficient as a farm proprietor as he even now has an opportunity to be. In point of time we need not expect that this large-scale system will become the dominant form for many years even within those regions potentially most susceptible to this type of farm organization.

Social and Economic Consequences

The last task assigned in the topic given me is perhaps the most difficult and the one to which I have left the least space. Who can forecast the social effect of the development of large-scale farming units? What kind of rural life is likely to follow as a result? It will, of course, depend in every community upon the extent of the development. That a rather fundamentally changed basis of community organization and community life will result would seem to go without saying. It need not, however, be a poorer community life. On the contrary, it will probably be a richer one. While on the whole it will probably mean a smaller rural population in proportion to the land and capital involved, yet it should be a more intelligent and a more cooperative population, one constituting a better background for the development of worth-while community enterprises and community life.

The purely economic factors are perhaps a little more discernable; yet here,too, there is great uncertainty.

One of the most obvious results would seem to be a generally higher use of agricultural resources arising out of the greater efficiency which this system must show if it is going to develop and live. It would seem that these big units, if they do succeed in establishing themselves, will become training centers in farm efficiency and in rational organization for farm production and marketing.

It seems reasonable also to expect that they may bring a somewhat greater degree of stability into agriculture. There should be developed under estate management or managerial service to landlords a higher class of tenants. It should mean also that there will be more permanence in the type of farming on rented land and a more rational adjustment of the farming to the nature of the land and to economic conditions and forces than we have now. It is perhaps not too much to expect that this development will go at least some way in reducing the extreme variation in the cycles of production and price in such farm commodities as hogs, beef cattle, and cotton.

Finally, perhaps one of the most significant economic developments will be in terms of giving the agricultural classes a more closely knit texture and in evolving a more unified and definite policy for the industry as a whole. Certainly a farm population with a considerable sprinkling of outstanding men such as are required to direct these large units should be a more articulate farm population than is our present one. It should mean that on the whole our agricultural classes will be a greater rather than a less important power in the councils of the nation.

ECONOMIC ASPECTS OF THE ADMINISTRATION OF GROUPS OF FARMS UNDER NORTHERN CONDITIONS

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Farming has remained a business of small units in a society in which consolidation and centralization of management have been the rule for many years.

Experiments in large-scale farming operations in the past have not been so universally successful as to encourage extensive use of this method of land administration. This has been particularly true in the diversified farming regions of the North Central States. The obvious economies that may be affected by the large organization have in most instances been offset by losses entailed by increased physical distances, by lack of contact between employer and employee, by the discontinuous and seasonal character of farm work, and by the lack of standardization and the development of routine methods.

The farms in the United States require something like six million executive heads. About two-thirds of all those engaged in the industry are in this class. One of the great weaknesses of the industry lies in the fact that under its present organization executive responsibility must of necessity rest in large measure on persons not well qualified to carry it. However, because of the limited volume of business, farming does not offer a great opportunity for men of exceptional executive ability. Students of this problem have long considered ways of modifying methods of farm organization that will make it possible for persons of exceptional ability to extend their influence over a wider range without losing the many economies now tied up with small unit operation. A number of considerations are becoming of increased importance in this connection.

1. There has been a rapid increase in the amount and effectiveness of technical information in farming. The wealth or practical information and minute details that

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have been developed in connection with hog production, alone, in recent years puts the average farmer at a disadvantage. As this increased technical information becomes more effectively applied in actual hog production the disadvantage of the poorly-informed farmer will become increasingly evident.

2. There is the recently developed field of agricultural economics with its intensely practical information relative to markets, adjustment of production to take advantage of markets, the measurement and coordination of the various factors in production, and its studies of ways and means of increasing the effectiveness of management.

3. The increased speed and effectiveness of transportation and communication have tended to speed up farming somewhat and have decreased the importance of physical distance as a factor in the situation.

4. The extreme variability in market prices during this period of readjustment in farming has created at least a temporary situation which gives the farmer with marketing ability a decided advantage.

Income studies in central Indiana indicate a much wider variation in income than formerly existed. For the three years 1913-1915, the standard deviation in labor income in this region was $637 according to our studies while for the three years 1925-1927, it was $1,248. For this latter period the variation in labor income was greater than for the extremely prosperous war year 1918 when the standard deviation in labor income was $1,135. During the three years 1925-1927, five per cent of these farmers made labor incomes in excess of $3,000; while during the extremely prosperous war period 1916-1918 only seven per cent made labor incomes in excess of $3,000. Numerous farmers in this region have testified that the year 1926 was the most profitable in their experience, yet farming in this region has been generally in a depressed condition.

This extreme variability in income is due in large measure to the wide fluctuations in market prices and the sudden obsolescence of types of farming that formerly proved profitable. Farmers who can analyze the market and who quickly adjust their farm organizations to take advantage

of new opportunities are able to make satisfactory incomes. This factor which in former years was a relatively unimportant one and in most analyses was not even recognized, now becomes dominant. This situation presents an opportunity in group management that has not previously existed.

5. The increased use of large and expensive labor-saving machines encourages large-scale farming or group operation.

Undoubtedly the present situation is more favorable to the development of group farm operation than formerly because of the greatly increased importance in the last few years of the factors mentioned. In our farm management studies we find a small percentage of the farm operators who have effectively taken advantage of the situation. The problem of the manager of a group of farms is infinitely more difficult in this respect than that of the individual farm operator, although his opportunity for advantage is also correspondingly greater. The manager of a group of farms must be able to put his ideas into operation through other men and on a greatly increased scale. It is probable that men capable of this task will not be plentiful and that many ventures will fail because of lack of executive capacity on the part of the management.

As has been pointed out the possible advantages of group operation are obvious and have increasing importance. The most difficult task is that of finding ways and means of putting such a scheme into actual operation. To this problem the remainder of this paper is devoted.

Large estates in the North Central States are usually on good land with the possible exception of coal and lumber lands, and those acquired recently through assignment and foreclosure. Estates on poor lands have almost always given trouble. A large percentage of the total net income on such land is absorbed in family living and goes to the occupant—hired man or tenant. Also poor lands require a large percentage of the total capital in working capital or improvements which the landlord is reluctant to furnish. The entire investment including the land itself is subject to depreciation and loss unless given careful supervision.

In most instances the landlord is an investor; he is not looking for a job. His land or capital is for hire, and he is anxious to get some way of putting his capital into safe hands so as to return him the maximum rate consistent with safety. If he finds it desirable to follow his investment in order to protect it, or because of opportunity for increased returns, he enters the field of the husbandman or farm operator.

Landlords must of necessity give some attention to the problems of management. The question is how far it pays owners of groups of farms to go in this direction. Are there any generalizations that can be made, and have there been any changes in conditions to warrant a different attitude? Are the changes permanent? Is the situation likely to revert to its former status or will it get progressively more favorable to change? Is farming in the North Central States through the exploitive stage in which the landlord gives a minimum of attention?

The regions in Indiana where most of these estates are located were relatively late in development; frequently they were low, poorly-drained, swamp or prairie. The great development came just following 1890. A rule of thumb procedure more or less closely followed on the best of this land in Indiana was to grow nine years of corn continuously after the original breaking, followed by twenty years of alternating corn and small grain before the introduction of sod crops was considered necessary. Thus after thirty years more or less of continuous grain farming depending on the original quality of the land and the husbandry, the owners of these lands find it necessary to give some attention to this problem if the productivity of these lands is to remain at a level conducive to profit.

Much of the best land in Indiana and Illinois is badly in need of liberal applications of phosphate, lime, clover, and manure. In order that the clover and manure may be produced and utilized to best advantage increased investments in fencing, buildings, and livestock are likely to be advisable.

The owner is not likely to be greatly interested in carrying the entire burden of fertility maintainance. If, after

furnishing the lime, the phosphate, the clover seed, the use of land to grow clover, the buildings and the fences, he receives only a share of the increased crop productivity and nothing from the livestock, he is likely to feel that the increased productivity is obtained at too high a cost. If the method employed is that of clovers without livestock, the problem is simplified for the landlord. But this is likely to entail too great a sacrifice, as the grass crop lays the foundation for the development of a livestock enterprise. The failure to develop it represents lost opportunity and increased cost of fertility maintainance.

The difficulty lies in the fact that the landlord is reluctant to make investments in working or movable capital. Working capital is to a greater or less degree perishable, movable, subject to depreciation, and in general, risky and likely to deterioration in incompetent hands. In fact some farm lands are comparable to working capital in this respect and for this reason are not looked on favorably by landlords.

Under the grain rent or cash lease as administered in America, adequate economic provision for fertility maintenance is very difficult and in large measure has not been accomplished on farms permanently set aside as tenant farms.

The reasons for this situation are as follows: 1. The adequate maintenance of fertility usually means increased investment in working capital. 2. Landlords are unwilling to do this under systems of leasing where administration of such capital and the major activities in management are in the hands of the tenant. Leases which require the incoming tenant to buy betterments from the outgoing tenant are difficult to enforce and usually end in the landlord's carrying the burden. 3. Tenants have in most cases no permanent interest in any particular farm and are loathe to use their own working capital, which is scarce, for farm betterments with no greater assurance than they have that they will benefit. 4. An adequate appraisal of betterments is difficult or impossible.

Two solutions are possible.

We may develop a body of laws relative to land-leasing

comparable to that in force in western Europe, in which the landlord assumes a minimum of managerial responsibility. The tenant carries the major responsibility for betterment and fertility maintenance with an adequate provision for reimbursements. While the many advantages of this system have been frequently pointed out there are economic and social reasons why it will probably be many years before this solution is accepted in the United States.

We do not have as yet a permanent tenant-farmer class. The American tenant still looks forward to ultimate farm ownership and regards his occupancy of any given farm as a temporary arrangement. The American landlord is in a large measure the former operator, or not more than one generation removed. We will need to make a long step before our landlords are willing to concede to the tenants rights in the land as to non-interference and vested rights in betterments, rights to occupancy, etc., comparable with those of tenants in western Eupore.

Our whole experience and all our individualistic social tendencies seem to point away from tenant participation in ownership through the development of rights in land.

The other alternative is landlord ownership and development of betterments to land and improvements. But as already pointed out this means increasing landlord participation in management, with the development of lease contracts in which the landlord furnishes part or all the working capital and finances in large measure all soil or building improvements. Along with this increase in financing must go increased participation in management to the extent at least that these investments are protected.

The livestock partnership plan, the one-third plan, the cropper, the hired man with a bonus, are all efforts to meet this situation. These problems are common to all tenant-operated farms in this area, but are peculiarly applicable on farms operated in groups or that are likely to be operated in groups.

The landlord who is a retired farmer owning one or two farms or the landlord who has one or two farms and who has been closely associated with farming constitutes a large class in the North Central States and in large measure has

been able to maintain a conservative system of farming. He usually has ample time for supervision. Often this constitutes his sole occupation. He has a wide experience on which to draw and intimate knowledge of men and conditions in the locality. Usually the farm is a tenant farm for a short time only, and, frequently, with a son or son-in-law as a tenant. Under these conditions the problems stated are relatively easily solved.

This paper is primarily concerned with the large and increasing number of farms in the North Central States owned by non-residents, or by the second or third generation of landlords, by persons in occupations other than farming, by banks, insurance companies, etc. Many of these farms have been subject to exploitive tenant farming with inadequate supervision for many years. On these farms, investments in working capital and betterments are likely to be badly needed and may be made to pay relatively large returns under competent supervision.

Research studies already made are of little help in this problem for very few such studies have been made and they are only fragmentary studies of a problem which needs for its solution an inclusive study covering a period of years. Also apparently we are still in the experimental stage of operation of groups of farms. Heretofore the great body of these estates has been administered with very little overhead cost and with little or no effort to share in the actual management. In the North Central States the annual charge for such management, which consists essentially in the securing of a tenant, the collection of rents and supervision of repairs, etc., has been a very small one. This usually amounts to less than one dollar per acre per year, five per cent of the gross receipts being a very common charge for the supervision of farms rented for a share of the crops. Where the land is rented for cash the charge for supervision is substantially less.

Recently interest in other methods of group farm operation has grown. Numerous organizations have undertaken or are contemplating closer management and increased participation in operation. Many of these methods have never been given an adequate trial in general use. These ex-

periments, while in many instances not yet far enough advanced to permit generalization, offer a great opportunity for study. Leasing for cash is the method requiring the least management and risk on the part of the owner of a group of farms. It is questionable whether such a method of management rightly comes within the scope of this paper, as control of the farm owner over actual farm operation is a very feeble one. Certainly few economies and relatively little increase in the net rent over a period of years could be expected where a group of farms was operated together as compared to farms operated under single ownership. The same is true in large measure of the crop-share method of leasing. The contribution of the landlord or his agent toward the determination of policies of organization and management is greater than with the cash-lease method but the greater share of managerial responsibility still resides in the tenant. It is doubtful whether a highly-skilled manager of a group of farms could add much to the net rent as compared with the plan of individual supervision by persons of ordinary qualifications. Probably the largest problem in connection with this type of lease is that of tenant-selection, coupled with a policy which encourages the tenant to work out a logical plan of farm organization. The great difficulty lies in the fact that, even were the management skillful and competent, most of the authority still resides in the tenant through his ownership and control of working capital.

Most of the more recent proposals for group operation of farms contemplate systems of tenure in which the landlord becomes actively engaged in the determination of policies and exercises actual control over working capital. These proposals range all the way from the livestock partnership lease plan to complete operation by hired men with or without some bonus plan. This is the field in which we lack experience and in which many interesting experiments are under way.

The livestock partnership plan contemplates equal joint ownership by the landlord and the tenant of all productive livestock, with joint sharing of all receipts and all expenses except those involving labor, and equipment, which are

cared for by the tenant, and those involving the maintenance of real estate, which are met by the landlord.

There are numerous advantages under this plan from the landlord's viewpoint. He has an effective way of putting the badly needed working capital on his farm and still retaining a reasonable control over it. He should find it under competent management a relatively profitable investment. It permits the farm to be operated essentially as an owner-operator farm because most of the interests of the two parties are identical. From the tenant's point of view it is likely to prove profitable for it gives him the advantage of competent and experienced advice. It frequently creates easier credit conditions for him and usually results in a more permanent tenure.

There are, however, many difficulties likely to be encountered, particularly in the operation of a group of farms by this method. This method is frequently used and is usually successful where the landlord and tenant are related as father and son or son-in-law or where the owner is a retired farmer with an intimate acquaintance with men and conditions in the neighborhood and with ample time to supervise and care for his interests.

The manager of a group of farms is likely to lack this contact and at least for a period of years would frequently find a lack of confidence on the part of the tenant that might prove disastrous. It is doubtful if a manager of a group of farms would find it profitable to devote as much time to each farm as the retired farmer devotes to his single farm.

The authority under the livestock partnership lease is so nearly equal in both parties that any lack of confidence or discontinuous contact may result in friction and frequently the landlord may find his recommendations ignored or only half-heartedly carried out. The question of credit becomes an important one. Tenants who are likely to be interested in a livestock partnership lease are usually short of capital on their own account, and look to the landlord for financial aid.

In these days of easy consumption credit and partial payments the livestock tenant frequently becomes involved and may become discouraged or fail financially. The landlord

in order to protect his investment must keep the indebtedness of his tenant to himself protected by mortgage or by other device. He may find it necessary also to keep close contact with his tenant's financial condition in order to forestall, if possible, financial difficulties on the part of the tenant. Our income studies on livestock partnership farms thus far have failed to reveal landlord losses of this nature, although we know of many cases where the landlord has lost in this way rather large sums. Another source of loss in this connection occurs when the tenant becomes discouraged for one cause or another, as has so frequently happened in recent years. A lot of fattening cattle half through the fattening process can shrink enough during a few weeks of careless management to remove all possibility of profit.

If the arrangement proves unsatisfactory for any reason it is a difficult one to terminate. It takes years to build up a satisfactory going concern in most kinds of livestock farming. Most livestock partnership leases contain a clause to the effect that in case the tenant fails to live up to his obligations, he, the landlord, may enter on the premises, hire whatever labor is necessary and take over the farm operation to protect his interests. This clause, however, is an extremely difficult one to enforce and is almost entirely worthless in protecting the landlord's interests. A livestock partnership lease unsatisfactory to the landlord usually requires months to settle and almost invariably results in loss to the landlord because he is not in possesion of his own property. To summarize, it seems likely that the manager of a group of farms would not find the livestock partnership plan a universally successful device for putting his ideas into operation, because of his lack of complete authority over and control of his property, and because in the nature of the case the managerial function must remain in large measure in the tenant.

Another proposal for the operation of groups of farms is that the entire responsibility for management be assumed by the landlord and that the farms be operated by hired labor with a well-paid man in charge of each farm but responsible to the general management. A number of fin-

ancial institutions in the North Central States which have recently found it necessary to take over large numbers of farms on foreclosure are contemplating this method or some modification of it. Frequently these farms are badly run down and are in such condition that it is practically impossible to obtain a good tenant on any basis. These farms do not provide, in the writer's judgment, an auspicious place on which to perform an experiment in hired-man farm operation.

The difficulties in hired-man farm operation are numerous. Farm work has never been successfully reduced to a routine. Even the simplest operations on a farm have not been standardized. The successful hired-man must be either self-directed or have efficient direction nearby. Hired-men who can recognize the condition of soil that is just suitable for cultivation, who will remember the brood sow just ready to farrow, who will notice the first signs of soreness on a horse's shoulder, or who will see a loose nut on the mowing machine, are difficult to find. In some types of farming where farm operation can be reduced to a routine and where action requiring judgment can be postponed a few days until the responsible manager is present there is less objection to this method. The rather extensive diversified system of farming followed in the Corn Belt States is a peculiarly difficult one in which to make use of unsupervised hired labor.

The payment of a bonus presents a possibility for increasing the responsibility of hired labor. Bonuses, however, are most effective when they can be applied specifically. For example, a man in charge of a dairy herd might be given a bonus for every hundred pounds of milk produced per day above a certain figure; or, in the case of hogs, for every pig raised to weaning age or ready for market at six months. Bonuses become less effective when the time over which they must be earned is prolonged or where the earning of them depends on care of many details. On a diversified Corn Belt farm any system of bonuses other than on the entire year's business is practically out of the question and is for this reason not likely to be effective.

A third plan about midway between the livestock partner-

ship plan and hired labor plan is frequently proposed and seems to have many merits. This is frequently referred to as the one-third plan of leasing and is the Corn Belt equivalent of the cropper method of the cotton and truck growing areas. With this plan the landlord usually owns all working capital, pays all operating costs and receives all income. The tenant furnishes all labor and may have some source of income such as dairy and poultry to cover his personal expenses or he may be allowed a drawing account. At the end of the year a settlement is made and the tenant is allowed one-third of the net income including increases, minus, of course, any allowances already received by him. This plan is frequently modified. Sometimes the tenant is permitted to gain a one-third interest in the livestock and frequently the land lord pays all of such cash costs as directly relate to land, buildings and equipment.

This plan has many advantages in the hands of a competent manager. Here the landlord has almost complete control over his investment and is in a position to positively determine the policies. The problem of credit to the tenant no longer exists because the title to all property resides in the landlord. There is relatively little chance for conflict of authority. The tenant, on the other hand, has almost the same incentive to careful management as though he were in complete charge. Landlord's property that is not directly productive may, however, be carelessly handled even under this arrangement. This is particularly true if the tenant has no share in upkeep cost of horses and equipment. This method presupposes a high degree of managerial ability on the part of the landowner or his agent, and has proved profitable under such circumstances. This plan or any other in which the landlord participates extensively in management is likely to prove profitable only when pemitted to grow in a slow conservative manner. For its success the general manager must not only be competent but he must have the confidence of his tenants, and this is acquired only as his superior ability is demonstrated in practice.

Farming is a slow business at best. It takes years to build up a sound method of organization. Unwarranted

speed invariably results in costly errors, unnecessary expenditures, and loss. This is particularly true when building up an organization in an uncharted field such as that under discussion. Probably many ventures are doomed to failure where this method or the livestock partnership method are being put into operation on a large scale in a short period of time.

For purposes of group administration farms may be roughly classified as follows:

1. Live estates in process of accumulation and in strong hands.
2. Old estates in second hands or in trust.
3. New estates created by circumstances of foreclosure, assignment or purchase to protect the lender.
4. Lands owned as an incident to mining and lumbering operations.

Groups of farms that may be classified under 1 can undoubtedly be operated by use of either the livestock partnership or the one-third plan. Here the entrepreneur interest is strong, the management resourceful and effective, usually carrying the full confidence of the farm operators.

The second class of farms, those owned by persons whose primary interests are elsewhere, and whose lands are administered by hired managers or trust companies, are likely to find the most profitable method of operation in the cash or crop-share lease, or some modification of it. If a more conservative system of farming is desired, the landlord must be content to carry the greater burden of it, even if there is some wastage because of failure to take full advantage of the increased investment. Both owners and managers under these circumstances are likely to be very conservative and to place absolute safety of investment ahead of income.

Farms in the third class are in much the same circumstance as those of the second, except that in most cases the lands are poorer or in a lower state of fertility and the improvements in a more run-down condition. The long-time policy of some of these owners seems to be to build these farms up and hold them until a normal land market returns in order that they may realize as little loss as pos-

sible. Because of good loans still outstanding these owners have frequently hesitated to put the farms on the market for fear of demoralizing the local land market, in which they are deeply interested. By forcing sales they might easily create a situation in which they would get new farms almost as fast as they disposed of old ones.

This is a difficult situation. The problem is to withdraw with the least possible loss when the entire investment of the company, including lands and outstanding loans, is considered. On the face of it, this appears like such a temporary situation as to be scarcely competent to a discussion of this kind. The justification comes in the fact that some of these companies are embarked on a program of management approaching complete hired-man operation. Unfortunately the poorest and most run-down farms are those on which hired men must be put because good tenants are not interested. These farms are the ones least likely to yield results under hired-man operation unless some very simple system such as a pasturage system can be worked out. Probably as good a plan as any for these farms in Indiana would be to put them into pasture, stock them with beef cattle, which require relatively little attention, and put one man in charge of several such farms. While such a system might not be highly profitable it might result in smaller losses than any other system. The owner of a group of farms has a peculiar advantage over the owner of a single farm in this respect. A single average-sized farm in the poorer land areas in Indiana will not ordinarily furnish full-time employment for one man if put into beef-cattle pasture. This frequently results in the continuance of a more intensive system of farming on this land than is warranted. An owner of a group of farms can combine two or more of them as to supervision even if they are not adjacent. Sheep, dairy cattle, or hogs would probably not prove so good under the circumstances because of the greater care required or their demand for high quality pasturage, roughage or concentrated feed. With the improvement in agriculture which will ultimately come, these farms should probably be returned to a more intensive system of farming. At that time the owners will be able to dispose of them in a normal land market.

The better farms will probably be most profitably handled when rented on a modified crop-share basis for the reasons developed earlier in this paper.

The results for a group of farms operated on the one-third plan are shown in the table. These unpublished data were furnished by O. G. Lloyd of the Purdue Agricultural Experiment Station. This group of farms, which would be properly classed under the first head, has been increasing steadily in number and is owned by one family. The manager is part-owner and devotes about half his time to the task. These farms, now twelve in number, average 580 acres in size, and represent an investment of about $90,000 per farm. Throughout the period the land valuation has been kept at the 1922 market value of $175 per acre.

TABLE 1. INCOME FROM A GROUP OF FARMS OPERATED UNDER THE ONE-THIRD PLAN IN WESTERN INDIANA[1]

Year	Average labor income of tenant	Rate earned on landlord's investment
	Dollars	*Per cent*
1920-21	2,131	4.8
1921-22	1,937	4.7
1922-23	1,602	4.1
1923-24	1,986	5.0
1924-25	1,989	4.6
1925-26	2,173	5.4
1926-27	1,551	4.1
Average	1,910	4.6

[1] Seven farms in 1921 and 1922, and twelve thereafter.

The farm owners retain title to all livestock and equipment, pay all expenses except labor and receive all income except from milk cows and chickens, which the tenant is permitted to keep in limited numbers. At the end of the year a cash settlement is made, the tenant receiving one-third of the net income. The landlord's percentage is calculated by substracting from the landlord's gross receipts all expenses, including depreciation, taxes, insurance, and a proportionate part of the manager's half-time salary of $1,800 per year.

One of the farms in this group has been continuously operated under this plan for thirty-two years. The manager is exceptionally skillful and efficient. The organiza-

tion has had long gradual growth and has developed a fine spirit of confidence and cooperation among the tenants, most of whom were chosen from among their own hired men. The difficulties in the way of a general extension of this plan have already been fully discussed.

Many of the advantages of group operation may be obtained by individual farmers through cooperation. Essentially the cooperative movement is an effort on the part of small producing and marketing units to gain the advantages enjoyed by big businesses. The small cooperatives that extend over a community or neighborhood have increased in numbers and usefulness in spite of the fact that public attention has been focused on the large cooperative marketing agencies. Farmers for many years have done things cooperatively often without any organization at all. The number of things that farmers can do in this way is capable of great extension.

A partial list of the things commonly done by local cooperation of farmers in the North Central States follows:

1. Threshing. 2. Silo filling. 3. Jointly owning breeding stock. 4. Jointly owning expensive machines. 5. Exchanging labor. 6. Cow testing. 7. Seed corn testing. 8. Crop variety testing. 9. Jointly owning electric lines. 10. Livestock shipping. 11. Carload buying of feed, fertilizer, feeding stock, etc. 12. Accounting. 13. Obtaining credit. 14. Providing fire insurance. 15. Orchard spraying. 16. Butchering. 17. Storing ice.

In all probability in the future, particularly in the richest agricultural areas, farmers may be expected to delegate more of the management function to specialists who are hired cooperatively. The county agent and the agricultural extension services perform this service to some extent now, but can not be expected to furnish the personal service necessary for continuous management. The self-supporting accounting service developed in Illinois is an excellent example of the possibilities in this connection.

Discussion by O. G. Lloyd

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The small amount of data available on the economic aspects of the administration of groups of farms do not permit conclusive inductive analysis. Data covering the last ten years from two groups of farms with different managers are alike in that they show more than double the rate of returns of all farms in the United States.

In one group the manager is an exceptionally competent livestock judge. Cattle sales comprise more than one-third the total farm receipts and most of the cattle are bought for the feed lot. Specialization has been increased by the division of work between the manager and his twelve farm operators. The manager does most of the buying and selling and each farm operator devotes himself to low cost production of crops and livestock. Such division of labor enables each farm operator to handle a larger volume of business with equal or lower cost per unit than as an owner-operator with a wider range of responsibilities. As the farm operator receives one-third of the net farm receipts, he has the incentive to industry enjoyed by the owner-operator.

The manager buys and sells in larger quantities for the twelve farms than would be the case with each of twelve owner-operators. His responsibilities are largely those of directing production according to the market demands. He is in constant touch with the markets. His contacts make his judgment the most sought-after in the community. At least half of his time is spent on the farms. He knows crop and livestock conditions first-hand and continually compares the conditions of crops and livestock on one farm with another.

He is in constant touch with the markets by telephone, telegraph, and radio. Daily he visits banks, elevators and stockyards to get first-hand information. He knows what he is doing most of the time, while most farmers are groping in the dark.

His connections with the markets enable him to do much business at long distance by description. The writer accompanied this manager to see several droves of cattle. The manager expected an inquiry from a cattle buyer that evening. The call came a little later than expected and I overheard the following conversation over some five hundred miles of wire, "I know why you are late." "Why?" "You were over looking at those—— cattle." "Yes!" "And you bought them?" "Yes!" "And you paid $15.50 for them." "Yes."

In the next three minutes this manager sold three droves of cattle, one at $15.25, another at $15.50 and the third at $15.60—all the market justified and a little higher prices than earlier or later that week. This sale exceeded $30,000 and the buyer had not seen the cattle for more than three weeks.

I am satisfied that under this group administration these thirteen men with one as manager are *doing a larger business at a lower cost and obtaining higher prices* than they could as thirteen individual owner-operators. Such administration recognizes the aptitudes of each individual and the fact that some men are low cost producers but poor buyers and sellers.

The other group of farms has as its manager a college-trained man who is introducing the most up-to-date scientific information on his farms. His understanding of soil conditions, crop and seed selection and nutrition are making his fertilizer, legume, and dairy program a success.

The land tenure differs according to the capital, experience, and ability of each farm operator. Some are crop-share renters, some stock-share renters and others simply hired men.

The superior knowledge and experience of the manager maintains the confidence of all the farm operators so that the choice of crops and livestock is left largely to the manager.

This administration effects economies through the better use of land, through crop selection, etc., and is more of an educational process than is found on the other group of farms.

In the first case the manager largely performs part of the production services—he does the buying and the selling, thereby saving the time of the farm operator to prepare the seed bed, plant, cultivate, and harvest the crops, and to feed and care for livestock. This division of labor permits a large business at a lower cost and obtains a higher price than would be the case if these same farmers were owner-operators.

In the second case through the efforts of the manager the quality and quantity of production is greatly increased by a more complete and economical utilization of the factors of production. The economic justification of the administration of groups of farms may not reside in one case more than in the other. The functions of the manager differ in the kinds of utilities created but each is truly a part of production.

ISSUES INVOLVED IN THE READJUSTMENT OF FARM ORGANIZATION IN THE COTTON BELT

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The agriculture of the Cotton Belt to-day presents a rather complex picture. There are in progress significant and hopeful trends, but at the same time there are to be found in certain areas some of the most subnormal and difficult situations now confronting American agriculture.

In this paper the attempt will be made to state some of the general features of the situation in the Cotton Belt, especially in the Southeastern States, from the standpoint of farm organization and to discuss some of the leading issues that are involved in the adjustment of the agriculture of that region to new economic forces and conditions.

A low scale of income has always been characteristic of a large portion of the farm population of the older sections of the Cotton Belt. Cotton production as it has developed has been associated with cheap labor. The culture of the crop in the East demands a large amount of hand work especially for hoeing and for harvesting. These operations do not require a high order of skill or intelligence. With a large supply of labor adapted to these simple processes and willing to take low returns, and to a considerable extent having no alternatives, a large portion of the workers engaged in cotton-growing have lived on the bread line.

A powerful economic factor, however, at work in recent years has greatly reduced the supply of cheap labor in cotton production, namely, the growth of industry with its demand for large numbers of workers. The trend of cotton production westward into areas where easier weed control and the level topography permit the cultivation of much larger acreages per man than in the eastern portions of the Belt has done much to raise the economic status of the grower.

This paper was read at the nineteenth annual meeting of the American Farm Economic Association, at Chicago, Illinois, December, 1928.

Economic Effects of the Boll Weevil

This movement of cotton farmers into industrial employment and the shift of cotton to the West has in part been stimulated by the cotton boll weevil. This pest has upset the equilibrium of the agriculture of the old part of the South and has caused there nothing short of a large-scale disaster. Probably no agricultural areas in the country have suffered greater economic losses than the weevil-stricken region of the old Cotton Belt.

The boll weevil has wrought its greatest damage in the more humid sections east of the Mississippi river. It has practically wiped out the cotton-growing industry along the Atlantic seaboard and the edge of the Coastal Plain touching the Gulf of Mexico. The area which has suffered most in recent years is a belt extending from central and northwestern South Carolina westward through the central and southern portions of Georgia and Alabama to the Mississippi river. Throughout this area there has been a wholesale abandonment of farms and a severe reduction of the crop acreage, amounting in some areas to almost fifty per cent.

There have thus been left idle several millions of acres of land formerly used in cotton production. The loss to land owners has been tremendous. In much of this afflicted territory the plantation form of organization prevailed, in which the actual labor in cotton production was performed by tenants. This type of cotton farm organization, already on the decline, suffered further disintegration when the boll weevil arrived. The landlords have in many instances moved to town and have sought a livelihood in other forms of activity, though still retaining title to their land holdings. Many of the tenants have left, but there are still remaining thousands of workers, not capable of managing large holdings, who receive less supervision and who are assuming the function of management to a greater degree than formerly.

There exists at present not only the problem of the utilization of large areas of abandoned land but also the development of a type or types of farming which may offer a better opportunity for making a living than the precarious

business of growing cotton in the areas subject to severe damage.

Diversification

The question of utilizing idle land and of discovering a substitute for or supplement to cotton is a part of the larger question of what enterprises may be conducted with profit in the South, with special reference to the older parts of the Cotton Belt.

In any program of readjustment it is obvious that if the large land resources, now idle, or used at an economic loss are to be adequately utilized, they must be employed in the production of a staple commodity. Cotton which has been for so long the basis of Southern agriculture is a great world staple and any other enterprise which may be conducted on a wide scale occupying millions of acres of land and furnishing profitable employment to hundreds of thousands of workers must be a staple commodity with a broad, dependable market.

In canvassing the available opportunities, we find at the outset that we are limited to a very few enterprises, because the great staples grown in the United States are very few in number.

Corn ranks next to cotton as a crop grown widely in the South, but it is mainly limited to farm use. The South has never been able to compete with the Corn Belt in corn production, and probably no one would insist that a large part of Southern agriculture could be reorganized on the basis of the corn crop.

Hay is widely grown in the South, although the total acreage has been small in comparison with the total crop acreage. High freight rates have given some advantage to the South in producing hay for local consumption, but with a declining demand for hay it is inconceivable that this crop could provide a basis for a new type of farming over a large area in the Southeast.

The fruit and vegetable industry has developed rapidly in the South in recent years especially in certain areas in the lower coastal plain, where the climate gives certain advantages. However, the entire acreage in fruits and vegetables forms such an insignificant fraction of the total

crop acreage as to be not worth considering as offering general possiblilities in any scheme of reorganization of Cotton-Belt agriculture. The same kind of limitations exist with respect to tobacco and peanuts.

What opportunities may we find in livestock enterprises in the South?

Where the hog enterprise is conducted as a major source of income in the South it is usually based on peanuts or soybeans where especially advantageous conditions exist for these crops. The South has not been able, however, to compete in a large way with the corn-hog belt in pork production. It is not inconceivable that some expansion may occur in the South in the production of hogs for local markets, and there may be further expansion in the hog-peanut industry. But it is significant that the numbers of hogs in these commercial hog areas have fluctuated violently in response to changes in the price of cotton.

Dairying has been preached a great deal in the South since the advent of the boll-weevil. The distribution of the dairy enterprise in the South, seems to follow either nearness to cities or the presence of pasture land not well suited to cotton. There will undoubtedly take place an increase in dairying in the South as industries develop and the urban population increases. In the Black Belt of Alabama and Mississippi dairying has increased and some of the large milk manufacturing concerns have located plants in this area. The present limited markets for dairy products in the South suggests that this enterprise has only moderate possibilities in solving the problem of farm reorganization.

Good pastures, which are fundamental to the livestock industry, are limited on most Southern soils. On low lands good pastures may frequently be found, though even these are usually not as productive as pastures found on soils with rich lime content. There are no native grasses of high quality which of their own accord may be expected to cover millions of acres of upland now relatively unsuitable to cotton because of the boll weevil. This lack of pasture suggests that the beef cattle and sheep enterprise have only limited possiblities except in a few specially favored localities such as the Black Belt.

There has been a substantial increase in the poultry industry and further expansion near growing cities may be expected. It is possible that the climate of the Cotton Belt, especially of the Gulf Coast with its mild winters, gives the South an advantage in egg production that may furnish a basis for further expansion in that region. This development, however, applies to a rather limited area. Poultry as a minor enterprise on cotton farms seems to be receiving more attention than formerly.

In our consideration of staple products we have left, one great crop which is already beginning to occupy much of the abandoned land in the Cotton Belt, namely the timber crop. Pine forests at one time covered most of the land now abandoned and it appears that it may return to its former use. In view of the diminishing supplies in this country it seems that timber might occupy several millions of acres of land in the South, affording an economic return to the land without danger of adding a burdensome surplus to agricultural production.

While probably as much as twenty per cent of the agricultural income in the Southeastern cotton States is derived from sources other than cotton, it must not be supposed that these enterprises are always or even usually combined with cotton. One reason for the high specialization in the South is that cotton does not lend itself readily to a diversified type of farm organization. The crop is rather greedy in its labor requirements and exacts a lion's share of attention through a greater part of the growing season. The peak of labor in the spring and early summer takes the heart out of the period when most other crops are planted and carried through their initial stages. The requirements at harvest time keep the family busy over a period of several weeks. There are few crops therefore that do not conflict with cotton in seasonal labor distribution.

Exceptions may be found to almost any generalization that might be made regarding the conduct of other enterprises than cotton in the South. The mistake is not infrequently made of basing broad recommendations for Southern agriculture on exceptional cases of diversified farming, or non-cotton farming. The point of this dis-

cussion is that cotton is the only cash crop which may form the basis of farm organization on any large proportion of Southern farms. Already in much of the weevil-stricken region cotton is coming back, and measurable progress has been made in growing cotton under boll-weevil conditions. Nothing but extremely low prices for a period of years will keep cotton from continuing the basis of Southern farm organization.

Large-Scale Cotton Farming

The objective of effective farm organization involves the creation of a maximum exchangeable economic surplus per worker. We have noted that the cotton grower in his effort to create such a surplus is in large measure limited to the great world staple which he is now producing, and that a type of farming, diversified with respect to cash income does not appear to be economically feasible. The question arises then, what possibilities we may find in the cotton enterprise itself for increasing economic returns through a larger output per worker.

There has been in recent decades a discernible trend toward greater efficiency in the production of cotton both in yield per acre and in acres per worker. While the average yield per acre has been lower during the past ten years than in any previous ten-year period in the past half century, there has been a substantial increase in productive efficiency because of the larger number of acres of cotton cultivated per worker. Had the boll weevil not appeared we should doubtless have seen a continuation of the increase in yields per acre.

While the increase in acres of cotton per worker seems to have taken place largely in the western part of the Belt, there has undoubtedly been improvement in methods of cultivating the crop in the eastern cotton States. The replacement of hand methods by machinery, the use of two-horse units instead of one-horse units, and the shift of cotton to more easily cultivated lands has brought greater efficiency in growing the crop.

The operation of large acreages of cotton per man in the western States is made possible by especially favorable

conditions prevailing in that region. These conditions are mainly low precipitation, and level topography. Low rainfall enables cotton to compete successfully with weeds, eliminating almost entirely the hoe-work which is necessary in the eastern part of the Belt. The topography lends itself to large machine units. There is much land, however, in the Southeast which is sufficiently level to permit fairly large scale operations. We shall probably see a further increase in the number of acres handled per man and much more machinery used than at present, although the natural conditions probably will not permit the handling of as large acreages in the East as in the West. The large amount of hoe-work necessary in the Southeast is a serious limiting factor in increasing the cotton acreage per worker.

Harvesting cotton, in my opinion, is not so much a limiting factor in farm organization as is often supposed. In fact, under boll-weevil conditions, the problem has not been harvesting the crop but keeping the boll weevil from harvesting it. It is likely that a majority of farms plan their cotton acreage, not in terms of the unknown quantity to be harvested but in terms of the acres of land they can cultivate with their available labor supply. Harvesting cotton may be extended over a period of months but the prevention of weed growth has to be done with considerable promptness.

The operation of increasingly large acreages of cotton per farmer does not imply, as some seem to imagine, the necessity for a radical reorganization of southern farms. In fact, the size of farms has been declining in the Cotton Belt for several decades. The trend has been, and apparently still is, in the direction of the family farm under various tenure arrangements.

There are those who think some sort of organization of cotton farms in a way comparable with factory organization offers a solution of the problem.

Cotton farming, however, does not lend itself to a standardized routine, as does factory operation. Where biological processes are involved, and unpredictable situations, such as unfavorable weather and the appearance of pests, are constantly arising, a great deal must be left to individ-

ual initiative and responsibility. The experience has been general in the South that the most satisfactory plan of handling labor is to give it a share of the crop, thereby furnishing a powerful incentive to the laborer, to give attention to his enterprises as needed and to remain through the season and complete his task. This trend toward the assumption of greater responsibility by the operator represents economic progress and advancement of the individual. The southern tenant is becoming less rather than more like a factory hand.

The combination of several family units under one manager is not new in cotton production.

Most of the large-scale cotton farms at the present time in the eastern part of the Belt are probably either large plantations or are modifications of the plantation system. Data are not available on the results obtained from the newer types of large-scale cotton-farm organization, but it is difficult to see how the South can be reorganized into large units when the trend has been toward the disintegration of large holdings and toward the family farm as an independent unit of management and operation.

Intensive Cotton Culture

In contrast with an extensive type of cotton farming in the West where large acreages are handled with machine units, there are to be found in the eastern part of the Belt methods which may be considered intensive. In these areas commercial fertilizers are used on most farms as an aid to increasing production by increasing yields per acre.

The Alabama Experiment Station has found from a number of field tests conducted from 1923 to 1927 that the application of 325 pounds of fertilizer gives an average increase of 322 pounds of seed cotton above the use of no fertilizer, an increase of almost a pound of cotton for a pound of fertilizer. The second increment of 325 pounds of fertilizer results in an additional 216 pounds of cotton, about two-thirds of a pound of cotton for a pound of fertilizer. The third increment of 325 pounds gives 106 pounds of cotton or about one-third of a pound of cotton for a pound

of fertilizer. Thus we have in the use of fertilizer on cotton a typical example of the law of diminishing returns. On typical soils the curve of profits per acre shows a loss both with the application of no fertilizer or very small quantities per acre and when the very large quantities are used.

It appears that farmers in their actual practice fall materially short of using the optimum amount of fertilizer per acre as indicated by the curve of diminishing returns. How far would more intensive fertilization go toward rehabilitating the low-income areas of the old Cotton Belt?

As the quantities of commercial fertilizer applied per acre are increased the farmer's cash expenditures are increased. Resistance to the expenditure of the larger amounts of cash for fertilizer is natural, since they involve proportionately greater risks. Plant food is only one condition necessary to the growth of plants, and unless all other conditions are at their optimum it may not pay to bring any one condition to the optimum. Among the factors affecting the growth of the cotton plant are temperature and rainfall, which are beyond the farmer's control. Other factors are proper cultivation, and control of pests, which are frequently not at their optimum. In addition, the prices of fertilizer and of cotton involve risks each year that are not to be ignored.

One phase of the economic resistance encountered in making the larger expenditures for fertilizer is related to the credit practices in the Cotton Belt. A large part of the cotton crop is produced each year under credit arrangements. The banker is interested in the security of his principal and interest. He will ordinarily not be interested in increasing his risk through encouraging the farmer to increase his risks, although in so doing there might be increased opportunity for gain to both farmer and banker.

Another type of economic resistance to the larger applications of fertilizer is found in the tenure arrangements under which a large part of the cotton crop is produced. The land owner is interested primarily in securing rent on his land. He is interested in seeing enough fertilizer used to prevent a loss and to insure his rent. Beyond this point he is not interested. He will discourage the assump-

tion of greater risks than the necessary minimum. The larger the investment in fertilizer, the more important it will be for the crop to be cultivated industriously and for pests to be controlled. Many land renters find it difficult enough to collect the advance for usual applications of fertilizer and rents from the type of renter with which they deal. They are naturally conservative in the matter of increasing their risks and are constantly seeking to decrease them.

There appears to be a substantial opportunity for increasing cotton production per worker through more intensive fertilization, but only under favorable conditions of credit, tenure, and efficiency of the individual farmer.

The Credit Problem

The credit problem appears to be basically related to the reorganization of Southern farming on a more profitable basis.

While there has been considerable improvement in the credit system, there are still many undesirable features in present practices and apparently a great deal of room for improvement. The advancing and supply merchant have in many areas practically disappeared. Their function has in many instances been taken over by the banks, which has been a wholesome development. In making financial advances to croppers and renters, however, landowners often assume a major share of the risks involved, and as a result interest rates paid by tenants are relatively high. There is still a large volume of store credit each year in the Cotton Belt.

It seems that a system of distributing risks from one season to another might help the situation. Cotton production over the entire Belt is subject to marked variations from year to year in costs of production, in yields, and in prices. Bankers base their credit activities on short-term loans, probably averaging about seven months in length. A system based on two or three-year periods would tend to smooth out the irregularities of individual seasons and afford an opportunity for evening up the years of deficits with the better-than-average returns of other seasons.

Farmers have often experienced difficulties in obtaining adequate credit to enable them to hold their cotton for higher prices. In making investments in winter legumes for soil improvements, the farmer may not realize returns under twelve months or longer, yet securing production credit for as long a period as one year is difficult under present bank practices.

In spite of the forward step taken in setting up the machinery of the intermediate credit system it has been used to a limited extent by cotton farmers, and, as far as I am informed, not at all by tenants except in rare cases through landowners. More credit of the right kind is needed, but there should be associated with it, in the case of farmers of limited capacities, expert guidance and constructive supervision.

In the case of long-term credit we have another illustration of the inflexibility of our present credit system. The small farmer who is trying to own a farm will not be able to make a large initial payment or a fixed payment each year, because of the fluctuations in cotton income. Instead of advancing toward ownership under a method adapted to his special needs, he runs great risk of losing in an off year the progress he has made. A system of long-term credit under which the farmer would be encouraged and stimulated to build up a reserve in good years to protect him in the bad years will probably be necessary to encourage the thrift and economic advancement so urgently needed in many parts of the Cotton Belt.

Problems of Tenancy

No survey of the Southern situation would be complete without further mention of one of the most characteristic features of the present system of agriculture, namely, the tenure system.

Of a total of two and one-half million farmers in the leading cotton States approximately 58 per cent are classified as tenants. Of the tenants 11 per cent are cash tenants, 37 per cent are croppers, and 52 per cent are classed as "other tenants." Though all of these are classified by the Census as farmers, many of them are for all practical pur-

poses laborers who receive their pay in the form of a share of the crop. The cropper system represents an advance over the wage system in managerial responsibility, but under this plan the operator is really not a genuine tenant and generally owns nothing but his labor. The cropper has greatly retarded the development of social institutions. He makes frequent shifts from farm to farm. He lacks the economic motives and incentives commonly possessed by the home owner. He is not interested in soil building, permanent improvements, and the support of schools and other types of public improvements.

As had been pointed out, with the disintegration of the plantation system many of these croppers have advanced to a stage of genuine tenancy in the form of renting the land they cultivate. While this stage represents economic progress, this class falls far short of the most desirable type of farmer.

It is not unreasonable to expect that the evolution of Southern agriculture will continue in the direction of independent operation of relatively small holdings of family size. If this movement is to be stimulated, however, education and guidance will be needed. The problem involves the development and encouragement of thrift and the practice of economy. The present system discourages rather than encourages the practice of thrift. Mere preaching of thrift will not get the desired results. It is necessary to furnish strong economic motivation. It seems that nothing would be so effective in furnishing an objective as the opportunity of the possession of farm property and the ownership of land. It is probable that the great majority of tenants in the Cotton Belt would like to become more independent. State and Federal agencies may well begin to study the most helpful methods for facilitating such progress. To this end experiments in tenure and credit arrangements may be helpful in pointing the way to desirable legislation and changes in customs.

Limiting Factors

As a concluding observation we may say that an important limiting factor in making desirable adjustments in

farm organization in the Cotton Belt, especially in the older regions, is the capacity of the farmer himself. In the newer western part of the Belt the farmer is generally of an industrious resourceful type, and is rapidly working out the system best adapted to his conditions. In the East we have in large numbers the negro and a type of small white farmer whose inheritance and background has not been characterized by economic progress. There is here a challenging problem of education and the need for more favorable economic institutions than those we have at present.

In view of the fact that the cotton growers constitute nearly one-third of the farm population of the United States and annually contribute to the nation's farm income as much as or more than any other major agricultural industry, an effort to further the advancement of this region should form an important phase of a national agricultural policy and program.

Discussion by R. J. Saville

North Carolina Experiment Station

I wish to commend Mr. Pope for the thoroughness and preciseness with which he has presented for our consideration these issues and their implications as problems of readjustment in the Cotton Belt. I regret that time does not permit him a more detailed discussion of the issues, especially those which find application to the area as a whole and in which our research data are especially lacking. Since boll-weevil devastation is a fundamental point of consideration, more recognition should be given to the problems of pest control. Would not the area as a whole gain more by expenditure for control of pests through variety selection, fertilization practices, and pest attack than by emphasis upon further production in the more seriously affected areas?

In this discussion of the problems presented, frequent reference will be made of those conditions prevailing in North Carolina, where I am familiar with detailed studies of their adjustments. In a general way the conditions of production there are quite similar to those of the Piedmont and Coastal Plain regions of Georgia and South Carolina. While the situation in North Carolina is typical of only a small part of the Cotton Belt, nevertheless, the State has experienced both extremes of boll-weevil damage from complete devastation in the lower Coastal Plain and Tidewater regions to practically no damage in some of the upper Coastal Plain and Piedmont regions. Furthermore, the inability to adopt large-scale methods of production in the readjustment process may be partly overcome by many substitute enterprises.

To maintain and regain satisfactory farm incomes in the face of boll-weevil devastation and the increasing influence of large-scale cotton production, es-

pecially in Texas and Oklahoma, contributing influences suggested by Mr. Pope may be grouped into two classes of adjustments: first, the adjustments in the kind and extent of the various enterprises to be considered possibilities in any given area; second, the quality and quantity of the factors used in production. The former finds quite different opportunities and possibilities in the various regions of the Cotton Belt, depending upon the abundance and relative profitableness of alternative enterprises.

The latter class of adjustments, those relating to factors of production, are of much broader application than are enterprise adjustments. They offer a greater problem for both individual and regional execution. The lack of continuous research relative to possibilities and from-time-to-time accomplishments makes recommendation inadequate. Here, State or sectional programs offer more possibilities than any plan to be accomplished through individual efforts. I refer to the problems of cotton varieties, fertilization practices, and combating of the boll weevil to give stability to production; to the problems of land ownership, land abandonment, reforestation and timber production on a large scale; to managerial ability, family labor, and the tenure system; and to the credit facilities. Since some of these issues are to be discussed fully as another part of this program, no adequate statement of them has been attempted here.

The agricultural situation in North Carolina has been less serious than that pictured for the Cotton Belt as a whole. Where complete devastation by the boll weevil occurred, one of our most profitable systems of farming, based upon tobacco and livestock, has developed. Tobacco production has been on the increase throughout the Southeastern States due to its relative profitableness and intensive use of land and labor. Yields per acre of cotton for the State have remained high, usually among the highest of the State averages. No large proportion of the crop area devoted to cotton has ever been seriously menaced by the boll weevil. Numerous crops, some of them fairly profitable, are available to increase crop acreage, thereby getting more effective use of production factors as well as replacing cotton on the land most subject to weevil attack.

While tobacco has been the chief contributing enterprise in stabilizing farm incomes in the cotton-producing areas of North Carolina, a number of other crops, such as peanuts, soybeans, fruits, and vegetables, have been used with fair degrees of success. Improved freight schedules and the influx of motor trucks for transporting farm produce, especially the fruits and vegetables, to terminal markets offer still greater stability in the production of these alternative crops. The importance of coördinating enterprises within restricted areas is a factor that has frequently been underestimated. But if an area has few enterprises other than cotton, and production is limited by pest damage, it seems to me the solution to the problem is one of gradual abandonment in favor of less infested areas.

Mr. Pope has referred to the disturbance in labor utilization which cotton production causes when attempts are made to combine it with other crops, because of the high labor requirement in chopping and hoeing rather than in harvesting. The northern edges of the belt, of course, find these demands coming at a later time. Since much of the cotton labor is furnished by families

—often the children—the harvesting problem in competition with school work should not be overlooked. Perfection of a picking machine which will not be so costly as to be out of reach of small planters will bring a solution to that part of the problem, but is it not also true that it will at once change the tendency to handle the crop in production as it now is handled? Production labor is more readily available than is harvest labor. Our research studies have shown that this conflict between crops is not so serious as is often believed. The opportunity of using outside labor from nearby towns to handle these peak labor demands is in evidence and opens a new possibility for increased size of farm unit, more machinery and less regular labor on the farm. With us the harvest of cotton does conflict with corn but usually fits very well between tobacco harvest and peanut harvest, the two most important late summer and fall harvested crops included in the organizations with cotton.

What limits the acreage to be put to cotton annually is a much disputed question. Various explanations are offered such as credit available for seed and fertilizer, labor for chopping, harvest requirements, prospects of boll-weevil damage, past prices for cotton, and the increasing importance of seed as a by-product. All are significant insofar as individual farms are concerned, but relative price seems to be the most significant determinant for large areas. Complete elimination of cotton from many farm organizations will be difficult even at a much lower average price than now prevails because of the way it utilizes labor.

Farm wages have been higher in North Carolina than those prevailing generally in the Cotton Belt. The agricultural depression has been less severe. Expansion of industrial enterprises in the Piedmont region has absorbed some of the surplus farm labor. Present indications seem to make industrial competition permanent. Although unemployment in textile mills has existed, its effect has not changed the situation materially. The importance of the State's recent demands for labor for its internal development must not be overlooked.

Under the most favorable conditions for enterprise adjustment probably to be found in the Cotton Belt, farm incomes in North Carolina have been inadequate, and the pressure of demands to meet costs of local improvements such as schools, roads, and health, has merely brought out more forcefully this weakness. Diversification as a means of improving individual farm incomes in the Cotton Belt has undoubtedly been overemphasized. Farm purchasing power is closely associated with gross value of the cotton and tobacco crops. Granting that it is profitable to make these adjustments in certain sections, the general conclusion usually has been that the whole of the cotton area could do likewise. Nothing is more erroneous or misleading to the possibilities of such adjustments. When viewed from the standpoint of a given classification of resources, the economic gains from annual or long-time enterprise adjustments are small and doubtless are often not much of a stimulus to farmers. Of the adjustments, those where a more intensive crop is substituted seem to be more feasible than where less intensive crops are used as the alternative for cotton. So frequently the latter merely resolves itself into a smaller farm business because of inability to adjust land and capital needs to the new situation.

Livestock enterprises are relatively more important as industrial concentration and per capita consumption increase. Except for these rather slow developments, livestock production is at a great disadvantage. Aside from the fact that it offers some utilization of certain resources, the livestock enterprises usually possible are generally so small that production is inefficient and is unable to offer much competition either to other local enterprises or to similar production in other areas.

The capital adjustments in evidence are in line with the notion of higher farm incomes. The increasing importance of the improved machinery, tractor and tractor implements and larger tillage machines makes possible an increased acreage per farm worker. Land may be handled in larger units thus reducing production costs. With the decreased labor supply at the farm probably the size of the farm business unit is increasing more rapidly relative to labor than census figures indicate. More emphasis should be given to credit facilities for supplying working capital needs rather than for financing land accumulation.

Attention is frequently drawn to the uses individuals might make of land in the Cotton Belt now abandoned or temporarily idle. The problem should be to find some way of withdrawing more land of low economic productivity out of the hands of those who persist in using it. Individual attempts to solve this problem will probably be unsuccessful and uncoordinated. Where utilization may be accomplished by timber production it seems that State or National control would be more feasible than private ownership.

If we are to suppose that the family-sized farm is the most efficient unit of agricultural production in the Cotton Belt and expect a high family income, the solution must be found in profitable supplementary crops which may be brought into the organization with cotton. It is evident from results of studies in North Carolina that these family-sized farms operating a unit that may be handled by the family labor force are much less adequate to make high farm incomes than a system of cropper-operated farms where at least two or three tenants are used. The so-called family-sized farm, the size of which is very indefinite, has no opportunity for a high labor income because its total physical productivity at the most renumerative prices to be expected will not yield it. As a problem of adjustment, the family-sized farm with present possibilities of machinery utilization and a notion of increasing farm income are almost contradictory.

As long as large numbers of the agricultural population are content to receive meager incomes and strive for nothing better, incomes will certainly remain low. Have we not often mistaken the viewpoint between maximum opportunity for increasing income and the best defense against complete economic loss and an assured independence though almost on the subsistence level? The human factor is of utmost importance. What change is taking place in the level of this lower limit, with which individual producers are willing to be content when opportunity of industrial employment avails itself? The problem of training for managerial capacity to meet a situation where larger producing units and more enterprises are essential and in which market information is becoming more important should be the educational aim of every State and regional agency in planning its agricultural programs.

Discussion by O. M. Johnson

Bureau of Agricultural Economics

The evidence presented seems ample to support most of the general conclusions which are: first, there is no staple crop in sight capable of replacing cotton to any great extent; second, progress in the livestock industry will be local in character and not at all rapid for the whole region; third, incomes for the masses of farmers have been and still are very low; fourth, neither a radical change toward more intensive nor more extensive farming is to be looked to for a real solution of the problem.

Perhaps the first question which is raised in view of the whole situation is how much farming will be carried on in the section under discussion. While the effect of western competition has been recognized, it may be well to inquire as to its relationship to the possibility of more intensive culture in the Old South especially with respect to the application of commercial fertilizers. The fact that the cost of fertilizer is relatively lower than other farm costs will make this feasible just so long as the eastern cotton grower has a margin of profit. If fertilization is increased generally, or if western growers take in more land, or if both movements take place, then we may find the price of cotton lowered to a point where increased application of fertilizer will not pay, but the extensive grower of the West may still further cut costs by improved technique. At least there seems to be more of a possibility in that line than of fertilizer costs being still further lowered.

If we grant that no staple crop other than cotton is likely to be immediately available, and if there is doubt as to the probability of more intensive culture, we must ask the question: Will there be still further abandonment of land for farming purposes? It is hardly conceivable that standards of the living of the farmers can be lowered in view of the fact that now there is a fairly good opportunity for employment in other occupations. If this analysis is correct, then we must believe that more land will be found uncultivated in the future than at present. On the whole we cannot regret this, since it probably means that those who have been working this land will be better off. In the process, however, there will be loss to many who have interests in this section. The land owners find themselves worth much less than formerly, credit agencies have farms on their hands, towns and cities do not have the income from the farming of the region and so on with a long list of persons and institutions adversely affected.

Naturally from these individuals and groups come suggestions as to how the situation may be improved. Some think that here we have a catastrophe similar in character to a flood for which the farmers are not responsible and that the whole country through some kind of Federal aid should come to the rescue. The justice of this plea depends of course on the facts. These seem to show that this is simply the climax of a trend that has been in existence for some time and that while there was more than a usual amount of disorganization as a result of the sudden decline in cotton production due to boll weevil, it is very likely that some of these old lands would have been abandoned under any usual conditions.

One other fact must be remembered so far as the owners are concerned. A very large acreage of land was not even supervised to any great extent

by its owners. Cotton production and the systems of renting had become so standardized that the owners, as many admit, found it very easy to get along by seeing that the tenant or cropper had feed, food, and fertilizer. Now if adjustments are to be made under existing conditions, the land owner must take the initiative—the tenant has neither capital nor ability to make changes. Many land-owners do realize their responsibilities if they are to have any value left in their land, and all landlords must face the facts.

The suggestion that there should be experimentation along some lines is worthy of serious consideration. First, however, there should be a careful study of all the experiments now in progress under private leadership. As already indicated the old Cotton Belt with its millions of farmers offers a great opportunity for formulation of sound planning for the future. A study of the best now will help much, since there are such great variations in physical factors involved—soil, climate and topography—and since the people themselves vary greatly, it would seem reasonable to try to find out where farming should be carried on, what kinds of farm units can be adapted to the situation, what improvements may be made in the tenure relationships. Many of the people will continue to stay where they are now living and wise social policy would seem to point to trying to help them to be able to make a better living.

DIRECT PACKER BUYING IN THE MARKETING OF LIVESTOCK

PAUL L. MILLER
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In the livestock trade of the United States the central market centers were well established by the beginning of the present century as the dominant and characteristic feature of livestock marketing. Farmers and country dealers, succeeding the drovers of an earlier period, shipped their stock on consignment to these public market centers, there to be sold for their account. As railroads were extended westward these market centers evolved in response to the requirements of efficient country disposal as well as to the requirements of slaughterers and all manner of packers and processors for a dependable and adequate supply of animals for their operations. The establishment and development of these trading centers constitutes a very important chapter in the history of livestock marketing.

For the purposes of this paper it is not necessary to give an account of the rise of these centers of trade as the livestock industry moved westward across the country until they surrounded that section of the country where livestock production has become increasingly localized. It will suffice merely to note here that they have provided gateways for the cattle and sheep of the prairies in their movement into the feed lots of corn belt farmers or to slaughtering centers, as well as convenient market places for the finished hogs, cattle and sheep of corn belt feeders.

There is another development in livestock marketing of quite different character. Since 1915 and particularly during the past ten years there has been a marked increase in number of hogs marketed directly from country dealers and farmers to packers and packer buyers rather than through the central markets. Substantially as high a percentage of cattle and sheep reach the packer through the medium of the public stockyard centers as at any other

This paper was read at the nineteenth annual meeting of the American Farm Economic Association, at Chicago, Illinois, December, 1928.

time.[1] In the case of hogs, marketing outside of the public market centers is on the increase. And this is occurring in the corn belt where the commercial hog crop is largest and where public market centers are most fully developed and readily accessible. This paper is an examination of the circumstances in the hog trade of the corn belt surrounding the increase of direct marketing and the economy of it.

In a broad sense direct marketing in this connection merely refers to the buying of hogs by packers directly from country dealers and farmers or to the disposal of hogs by dealers and farmers directly to packers. It may be thought of either as direct packer buying or as direct selling to packers. Yet, there is a distinction between these two ways of putting it that appears when one considers the technique and the economy of it. Direct marketing of hogs in the corn belt is, at the present time, pretty much a matter of direct packer buying. Slaughterers are buying an increasing number of hogs in the country, directly from the producers or local dealers. The result is a notable decline in the percentage of the hog crop of the corn belt marketed through the public markets.

Extent of Direct Marketing of Hogs in the Corn Belt

Published livestock market statistics do not furnish specific information concerning the direct marketing of hogs for more than six or eight years. It has been within this period, however, that direct marketing of hogs in the Corn Belt States has manifested any particular tendency to grow. Prior to this period the proportion of hogs marketed directly, according to competent observers, fluctuated inversely with the size of the hog crop. In years of relatively low production the proportion shipped to public markets for sale was reduced somewhat because the small packers located in producing regions were in a position to secure their usual quota. The result was that packers depending

[1] Direct marketing of cattle is increasing in the Corn-Belt as interior packers increase their slaughtering of cattle. Interior packers have slaughtered very few cattle until recent years. Even at present they do not slaughter cattle on as large a scale as they do hogs. In 1927 less than 9 per cent of the cattle and calves marketed in Iowa went to interior packers. But this was a big increase over 1920 when only 2.4 per cent went to interior packers. See Iowa State College Experiment Station Bulletin No. 254, page 48.

Concentration stations handle no cattle.

upon receipts at the market centers felt the competition of interior packers when production was low. At such times packers located at public markets resorted, to some extent, to country buying in an effort to maintain their plant operations as fully as the circumstances would permit. It was only after 1915 that direct marketing of hogs in the Corn Belt showed slight, if any, tendency to increase.

Published statistics enable us to study the marketing of hogs since 1920 more successfully. Beginning in 1922 the United States Department of Agriculture has published monthly data for the country as a whole, showing the proportion of hogs slaughtered by packers and wholesale slaughterers secured at the public markets, and the proportion secured from "other sources." The "other sources" indicate the extent of direct marketing. Combining these monthly percentages into annual averages we have the following tabulation:

TABLE 1.—HOGS SLAUGHTERED. PROPORTION SECURED BY PACKERS AT PUBLIC MARKETS AND FROM OTHER SOURCES, 1922-1928[1]

Year	From public markets	From other sources
	Per cent	*Per cent*
1922	76.4	23.6
1923	76.2	23.8
1924	78.2	21.8
1925	76.2	23.8
1926	73.0	27.0
1927	67.6	32.4
1928	65.1	34.9

[1] Data from 1925 Yearbook, U.S.D.A., p. 1186, for years 1922-1925. From Monthly Crops and Markets, U.S.D.A. for years 1926-1928. The percentages were given by months. Annual percentages are simply averages. Only the last six months of 1922 are included in the average percentage for that year and nine months in the 1928 average.

These data indicate no increase in direct marketing during this period until 1926. Since 1925 the increase has been substantial—more than eleven per cent of the total during the last four years.

What the situation has been in the corn belt, is better shown by similar data for a group of eight Central States, given out by the United States Bureau of Agricultural Economics. The states included are North Dakota, South Dakota, Nebraska, Kansas, Missouri, Iowa, Minnesota, and

Wisconsin. These data show the proportion of the hog supply of these states marketed directly each year since 1920.[2]

Except for the years 1923 and 1924 they show a steady increase, which for the whole period amounts to more than 14 per cent of the market supply of hogs produced in these states. It will be recalled that 1923 and 1924 were years of exceedingly large production, which naturally made it unnecessary for packers to compete as strenuously in order to satisfy their demands.

TABLE 2.—PERCENTAGE OF HOGS MARKETED DIRECTLY FOR 8 NORTH CENTRAL STATES, AND FOR IOWA, 1920-1928

Year	1920	1921	1922	1923	1924	1925	1926	1927	1928
8 States	20.2	23.4	25.7	25.6	25.3	26.1	27.1	32.4	34.9[1]
Iowa Directly[2]	32.7	34.9	38.9	37.4	36.5	37.5	42.7	49.0	—

[1] For six months only.
[2] Iowa Monthly Crop Report, January issues, 1920-1928.

Statistics show that a larger percentage of the hogs produced in Iowa is marketed directly than in other corn belt states. (See table 2.) In 1920 approximately one-third were disposed of directly to packers, the other two-thirds were shipped to public stockyards. Since then there has been a significant increase until in 1927 nearly one-half of the market hogs produced in Iowa were marketed directly. During this period direct marketing increased more than 16 per centage points. In spite of the slight recession for three years following 1922, it would appear that direct marketing of hogs in Iowa is a matter that must be reckoned with. This is especially true when it is considered that Iowa farmers produce for the market from 9 to 14 million hogs annually, which amount to from 20 to 25 per cent of all hogs slaughtered under Federal inspection.

But after all, what do these facts signify? The increase in the proportion of hogs marketed directly during the last ten years is obviously great enough to challenge attention on the part of all concerned with developments in the livestock trade. But it may be questioned whether direct trading is expanding because it is more economical to sellers

[2] These data do not include hogs shipped directly to packers at public market centers. Consequently they underestimate the extent of direct marketing.

and buyers under present conditions than public market trading. It may be pointed out that most of the direct marketing is accounted for in the direct buying by packers located at interior points in sections of expanding hog production, who have always secured the bulk of their supplies directly from farmers and local dealers. One writer writing on the subject in 1926, after considering the statistics, concluded that, "Since many of these (hogs), however, go to Iowa and Minnesota packers, who are not located at centralized markets, it is doubtful whether the increase is significant.[3] The fact that they are buying larger numbers of hogs in the country does not prove necessarily the superiority of their buying methods. It is only evidence that they are able, for other reasons, perhaps, to expand their operations. Even though interior packers gain some advantage from a location favorable for direct buying, other packers may be quite unable to adapt it successfully to their businesses. As a matter of fact representatives of public market packers, buying rather extensively in the country during the last few years, have justified this practice on the part of their firms not on grounds of economy but rather on grounds of necessity. They contend that they must resort to country buying in order to get adequate supplies. Conditions responsible for such a situation are worthy of investigation.

Furthermore, what is to be said concerning direct marketing from the viewpoint of the man in the country with hogs to sell? Some are inclined to consider it a recrudescence, a practice that tends to nullify the influences making for relatively stable values in the local trade that have come from the development of large strategically located public market places. Does the farmer who sells his hogs in the country to packers, especially to packers who might otherwise buy them at the public stockyards, fail to get the extra dollar, as it has been alleged, because he has allowed himself to be attracted by the extra dime that was offered to him? If there is any reason at all for affirming this, the basis for it may lie entirely in the lack of adequate facilities

[3] Monthly Letter to Animal Husbandrymen, Armour's Livestock Bureau, March 1926, page 5.

for direct trading rather than in any inherent disadvantage of it for him.

Changing Competitive Relations in the Packing Industry

If we would appraise the development of direct marketing of hogs in its institutional aspects, discover its meaning in terms of effective marketing, market organization, and price-making, we must begin by inquiring into the circumstances that may have induced packers to take advantage of conditions that have undoubtedly become increasingly favorable for country buying during the last ten or fifteen years. As already stated, direct marketing of hogs in the corn belt consists mainly in the securing of hogs by packers directly from country points through contacts established by them with farmers and country dealers. That is to say, packers have turned to the country more and more in their competition for hogs. Those unfriendly to this tendency have maintained that it has been an attempt on the part of the packer to avoid the competition encountered at public market centers. Representatives of packers with slaughtering plants at public markets have replied that they have found it necessary in late years to buy some of their hogs in the country in order to meet the competition of the interior packer in securing their supplies. It is claimed by them that interior packers have been cutting off supplies from the primary market centers, while at the same time they have been obliged to share the receipts at these markets with eastern slaughterers who have been coming to these market places with an insistent demand for a constantly greater number of hogs. In the face of these claims and counter claims it behooves us to learn what we can of changing conditions in the packing industry and how these changes affect the various packers differing in location with reference to the source of their hog supplies as well as with respect to the centers of pork consumption.

Decentralization in the Hog Slaughtering Industry

All students of livestock marketing know that from early days the packing industry has tended to center at the public markets. The relation between them not only is venerable

but also has been in a large measure one of mutual dependence. As the establishing of new stockyards markets moved westward and their receipts grew in volume local slaughter grew with them in like proportion, shifting the center of gravity in the packing industry in accord with the changing relative importance of the trading centers. The close association of meat packing with the growing or the waning importance of livestock trading centers in different sections of the country for so long a period more or less

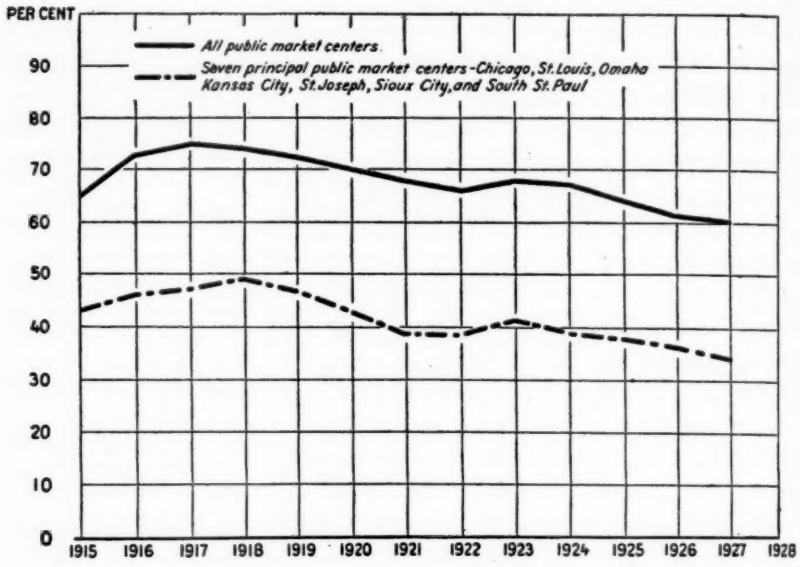

FIG. 1. LOCAL HOG SLAUGHTER AT PUBLIC MARKETS IN PROPORTION TO FEDERALLY INSPECTED HOG SLAUGHTER IN THE UNITED STATES, 1915-1927.

prepares one to accept the relation as natural and inevitable.

However, since about 1917 or 1918 an opposite tendency in these relations has been manifested. This is made evident by Fig. 1, prepared from statistics of hog slaughter published by the United States Department of Agriculture. It shows, first, the proportion between hog slaughter at all public markets and the annual total Federally inspected slaughter for the period 1915-1927. This has declined from 75 per cent in 1917 to 60 per cent in 1920. During this

period the number of hogs slaughtered at the market centers remained nearly constant, while the number of hogs slaughtered under Federal inspection increased at the rate of approximately 1.8 per cent a year.

Moreover, the decline of market slaughter in proportion to all Federally inspected slaughter in the country has occurred at the seven most important hog market centers, as shown by the lower curve in Fig. 1. The markets are Chi-

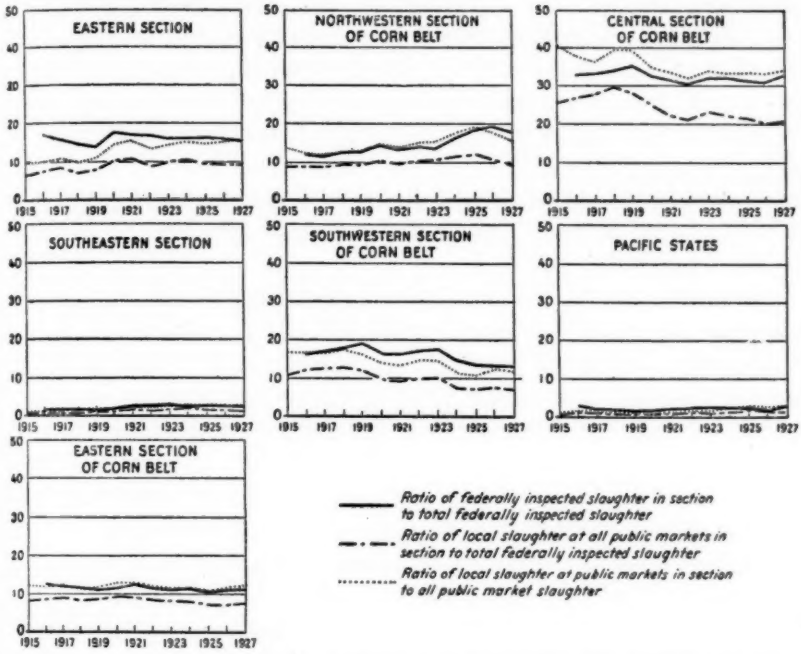
EASTERN SECTION
NORTHWESTERN SECTION OF CORN BELT
CENTRAL SECTION OF CORN BELT
SOUTHEASTERN SECTION
SOUTHWESTERN SECTION OF CORN BELT
PACIFIC STATES
EASTERN SECTION OF CORN BELT
Ratio of federally inspected slaughter in section to total federally inspected slaughter
Ratio of local slaughter at all public markets in section to total federally inspected slaughter
Ratio of local slaughter at public markets in section to all public market slaughter

FIG. 2. PROPORTION OF TOTAL FEDERALLY INSPECTED AND OF TOTAL MARKET SLAUGHTER IN VARIOUS SECTIONS OF THE UNITED STATES, 1915-1927..

cago, St. Louis, Kansas City, Omaha, St. Joseph, Sioux City, and South St. Paul. In 1919 local slaughter at these market centers amounted to 49 per cent of all hogs slaughtered under Federal inspection while in 1927 it was only 34 per cent. This is a decline of 15 per cent, which is exactly the decrease noted in the proportion of all market slaughter to total Federally inspected slaughter.

This situation may be viewed in more detail on Fig. 2, which is an attempt to present the statistics of hog slaugh-

tering in such a way as to reveal shifts that have taken place in the localization of the industry. It is based entirely upon data published or otherwise made available by the United States Department of Agriculture. The charts present these data by sections of the country, selected in such a way as to show important changes in the geographical location of the industry as well as the location of slaughtering with reference to the public market centers. The solid line represents the proportion of Federally inspected slaughter in the respective area or section to all such slaughter in the country. The broken line represents the proportion of local slaughter at all public markets in the respective area to total Federally inspected slaughter in the United States. The dotted line shows the proportion of local slaughter at all public stockyards in the respective area to local slaughter at all the public stockyards centers in the country.

The slaughtering at the public stockyards markets, which we may designate as market slaughter, in proportion to all Federally inspected slaughter has declined considerably during the period under consideration, in certain sections of the corn belt, particularly in the central and southwestern section. In the northwestern section it has increased somewhat.

It is apparent that local hog slaughter at many of the most important market centers has failed to keep pace with hog slaughtering in the country. More than that, the chart indicates where the growth in hog slaughtering has taken place. The solid lines on Fig. 2, express the proportion of hog slaughter in respective sections to hog slaughter in the entire country. As already explained the data are of Federally inspected slaughter.[4]

Taking up first the situation in the corn belt, it appears that in some of these states hog slaughtering has increased in proportion to total hog slaughter, while in others it has declined. The group comprising the northwestern section, has had a steady and significant increase. On the other

[4] They are the only annual data of slaughtering in the entire country available from published sources. From 60 to 65 per cent of all commercial slaughtering is done under federal inspection and the percentage has changed very little indeed since 1920 and only a few per cent since 1915.

hand, Kansas and Missouri, making up the southwestern section, have had a decline at about the same rate. In the central section hog slaughtering has about held its own in terms of slaughtering in the entire country, at any rate since 1920. Likewise hog slaughtering in the eastern section of the corn belt has kept pace with hog slaughtering in the entire country.

Market slaughter in the various sections of the corn belt has accounted for a declining percentage of the hog slaughtering done in the territory. In the northwestern section all slaughter in the territory has inclined upward since 1917. In the central section a relationship that is nearly opposite to this holds true. Federally inspected slaughter in this area has changed comparatively little in proportion to hog slaughter in the country, while local slaughter at the market centers declined considerably after 1916. In the other sections of the corn belt the ratio of market slaughter to all slaughter has been more constant.

The difference between these two curves in the various sections represents what may be termed interior slaughter in contrast to local slaughter at the stockyards markets. Reading the chart we learn that interior slaughter in the central section of the corn belt in 1918 amounted to only 5.4 per cent of all hogs slaughtered in the United States under Federal inspection. By 1927 it had increased to 12.2 per cent. For the northwestern section the corresponding figures are 3.2 per cent in 1918 and 8.3 per cent in 1927.

These data indicate how rapidly slaughtering has grown at interior points in hog production territory tributary to the most important livestock market centers. Hog slaughtering has clearly shown a marked tendency to spread out from these market centers into the regions of hog production. This is the situation with respect to hog slaughtering in those sections of the corn belt where hog production is being maintained.

We may next consider the situation with respect to hog slaughtering in other sections of the country. Again referring to Fig. 2 we may note that hog slaughtering since 1915 in eastern and southeastern territory has maintained its proportion to the number of hogs slaughtered in the

United States under Federal inspection. In fact it has increased its proportion slightly. In the states grouped as the eastern section it has run between 14 and 17 per cent during the entire period. In the states selected for the southeastern group it has increased one per cent, which amounts to little as far as the number of hogs slaughtered in the country is concerned, but which is significant from the point of view of slaughtering in the area, since it nearly doubles its proportion to Federally inspected slaughter in the country. Hog slaughtering in the Pacific Coast States during the period remained in about the same relation to slaughter in the entire country, approximately two per cent of total Federally inspected hog slaughter.

It is evident, therefore, that the number of hogs slaughtered annually in eastern and south eastern states as well as on the Pacific Coast has increased during the period under consideration, while the number slaughtered at principle stockyards markets in the corn belt has not increased. The movement of slaughter away from the principal market centers is further revealed by a comparison of hog slaughter at these markets with that of public markets in other sections of the country. The dotted lines on Fig. 2 facilitate this comparison. They represent the proportion of market slaughter at all stockyard markets. Before this period hog slaughtering was increasing more rapidly at the principal markets than elsewhere. During this period it has increased much more rapidly both at interior points in the territory tributary to the principal markets, and in the eastern, southeastern and Pacific Coast States.

It will not be possible in this paper to discuss the factors that have been influential in increasing hog slaughtering in eastern territory and in other important pork consuming sections nor to analyze the conditions that have given impetus to interior packing in the upper Mississippi Valley. Obviousy an adequate discussion of the economic factors bringing about these developments would in itself make a lengthy paper. We shall merely observe in passing that these changes in the localization of hog slaughtering have followed from changing economic conditions affecting the industry.

Two factors appear to have been most important in causing eastern slaughter to increase since 1918. These are freight rates favorable to eastern packers and the increased demand for fresh pork. Since 1918 the rate between Chicago and New York on dressed pork has been generally higher in relation to the hog rate than in the period before and during the early war years. Of equal and perhaps greater influence has been the rapidly increasing demand for fresh pork since the war period. Although the statistics of the production of pork products are difficult to interpret it is well known that the fresh pork trade has grown by leaps and bounds. The importance of this factor in the situation is evident when one considers that the production of fresh pork requires comparatively little investment and is conducted economically on a small scale, and further that the fresher it can be put on the block the better it sells. This gives the eastern slaughterers a considerable advantage. The same applies to slaughterers in other important consuming centers. It is an important reason for the increased hog slaughtering in the Pacific Coast States.

Economic conditions have also favored the interior packers of Iowa, Minnesota, and neighboring States. With them, too, rates have been an important factor. Relative rates applying to them have enabled them to compete much better with the fresh pork slaughterers in consuming territory. The postwar period has not brought to them the serious problems faced by the national packers. During the war conditions were very favorable to their efforts to become established in the domestic pork trade. So they have been well established in the home market during the post war period, while the national packers have been obliged to find connections in the domestic trade to take the place of declining export business. In addition to these advantageous circumstances, interior packers have been in a position to profit most from the rapid progress in rural transportation and the developments in the local hog trade. The former makes it easier for them to secure their hogs as well as to distribute their products to towns and cities within trucking distance. The latter has been a less obvious advantage to them, but a real one nevertheless. These factors and others

have enabled interior packers to make very rapid strides since 1918.

Sources of Hog Supply for Packers

We have referred above to shifts taking place in hog production in the United States. Having shown the relative decline of hog slaughtering at the principle market centers and its relatively rapid increase elsewhere, we wish at this point to make it quite celar that what we have termed decentralization in the hog packing industry has entailed a

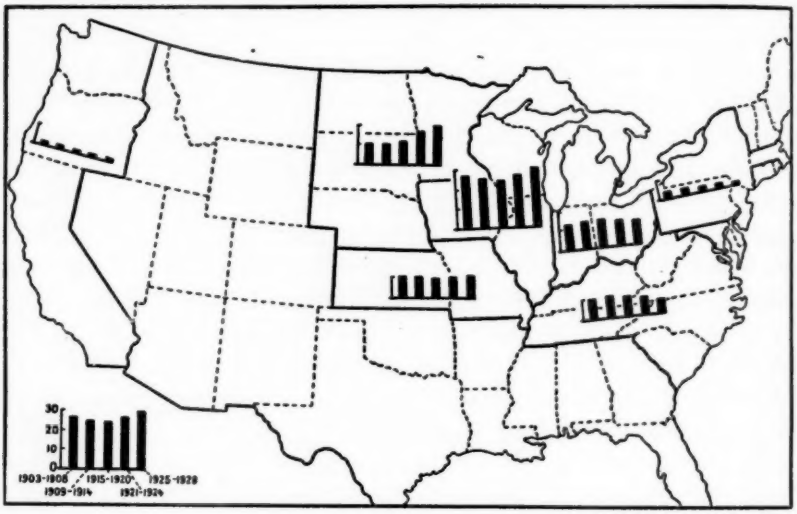

FIG. 3. RELATION OF HOG PRODUCTION IN VARIOUS SECTIONS TO HOG PRODUCTION IN THE UNITED STATES, 1903-1928.

fundamental change in the relation of packers to the sources of their raw material. First, observe from Fig. 3 the not uncertain tendency for hog production to become more and more localized in the central and northwestern sections of the Corn Belt. It shows changes occurring in the localization of hog production since 1903. From 85 to 90 per cent of the entire hog crop is produced in the States included in the various sections. The data used are of the number of hogs on farms, January 1st, as published by the United States Department of Agriculture. The whole period was divided into five periods. For each period the average num-

ber of hogs on farms in each section was found and expressed as a percentage of the average number in the entire country. The result is represented by a bar. Hog production has declined since 1920 in all sections outside of the Corn Belt and even in the eastern section of the Corn Belt. It has increased only in the central and northwestern Corn Belt sections, and here particularly in the northwestern section. The commercial hog supply has become more and

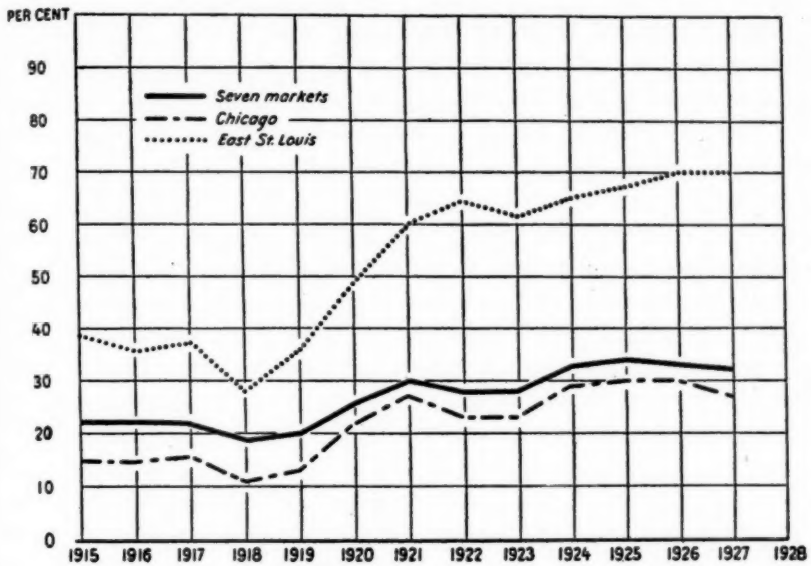

FIG. 4. RELATION BETWEEN RECEIPTS AND SHIPMENTS AT PRINCIPAL HOG MARKETS, 1915-1927.

more localized in a few central and northwestern Corn Belt States.

Second, we wish to describe briefly the problem of securing a dependable and adequate supply of hogs under these circumstances as it must confront packers in different parts of the country. Obviously local hog production becomes less and less adequate for the maintenance and expansion of hog slaughter operations of packers in eastern, southern, and Pacific Coast States. In order to secure supplies they have had to come to the market places of the central and northwestern Corn Belt. The fact that they have done

so is clearly indicated by the statistics of shipments from these markets. Fig. 4 presents the relation between shipments and receipts at the seven principal hog markets and also separately for Chicago and for St. Louis. The shipments are of hogs bought for slaughtering purposes. Most of these hogs are purchased through order buyers by eastern packers. In addition to the hogs secured at the market places some of the larger eastern slaughterers buy hogs in the producing regions tributary to these market centers, through their own concentration stations or through contacts established with private concentrators. This direct movement is growing.[5]

The interior packers of Iowa and neighboring States are located, so to speak, at the source of hog supply. They buy practically all of their hogs in the country rather than at the market places. We have already shown how rapidly direct buying of hogs has increased in Iowa. A good share of this growth is accounted for by the expansion of interior packing. In 1920, 20 per cent of Iowa hogs went to packing houses in or near Iowa. In 1927 these packers took nearly 36 per cent of them.[6] On a somewhat smaller scale the same thing has happened in adjoining States.

As a consequence the packers located at the market centers supplied from the regions inhabited by interior packers, have had their source of supplies impaired. And while supplies at their markets have been partially cut off, they have been obliged to allow their distant competitors to pick over the runs and to take a generous share of them before they knew what they could count upon for their operations. In this position, rather appropriately described as "between the devil and the deep sea," they have attempted to fortify themselves through country buying. Within the last 8 years they have supplemented the supplies secured at the markets by country purchases to an increasing extent.

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[5] It is certain that this movement is increasing, although it is impossible to separate the data showing it from the published statistics of the market distribution of hogs. While eastern packers have established no additional reload stations in Iowa since 1913, when there were seven in the state operated by them, reports from independent concentrators and shippers indicate increasing shipments of hogs directly to eastern slaughters.

[6] Iowa State College Experiment Station Bul. No. 254, page 47.

Effects of Decentralization of Hog Slaughtering

It has been necessary to study these changing conditions in the hog trade in order to discover why packers should turn so much attention to the establishing of direct connections with the country hog trade. Roughly speaking there are three classes of packers, which should be distinguished for the purposes of this study; the national packer with many plants scattered over the country, who does the bulk of his hog slaughtering at the principal market places; the packer who slaughters hogs at pork consuming centers in areas where hog production fails to meet his demand; and the interior packer, who has in a real sense grown up with the hogs.

Each of these packers has his own peculiar raw material problem, altho, in a large measure they compete in the same pork market. When the slaughterer in consuming territory buys at Chicago, let us say, he must pay the prices there, stand the expense of buying at that point and of moving the hogs from there to his plants. Perhaps the Chicago prices plus the additional expenses are so great that he finds there is some economy in establishing connections with a concentrator or even establishing a buying agency of his own in production territory tributary to Chicago or whatever market he has patronized. When conditions are favorable for doing this it is safe to say that some of the more alert will take advantage of them. The interior packer who must depend upon hogs that he can buy in the country tends to increase his operations as conditions for buying directly become more favorable. The national packer is meeting the situation in two ways. One of them is by transferring his slaughtering to interior points as well as to consuming territory. From the Directory of the United States Bureau of Animal Industry it appears that one of the national packers acquired two interior slaughtering plants and three slaughtering plants in consuming territory during 1926 and 1927. The other method by which the national packer is attempting to meet his situation is country buying of hogs. Inasmuch as he is clearly confronted with a serious competitive raw material problem he is bound to take

advantage of any developments that make direct buying feasible and economical.

Economy of Direct Buying

The economy of direct packer buying of hogs depends upon the methods of buying that may be employed and the conditions under which they may be developed. We may discuss these only briefly, although a full consideration of them is required for an understanding of the advantages and disadvantages, possibilities and limitations, of this method of hog marketing. The following is a classification of methods of direct packer buying:

I. Operation of country buying agencies.
   1. Packer track buyers.
   2. Packer concentration stations.

II. Buying from private operators delivering to plant.
   1. Local stock dealers.
   2. Private concentrators.

III. Buying from producers delivering to plant.
   1. Farmers.
   2. Farmers' local associations.
   3. Farmers' concentration and sales agencies.

Under the first method the packer makes his contacts with the local trade through his own agents, who buy and pay for the hogs at local stations or at concentration points. Under the second method the packer establishes his connections with private dealers, who buy hogs on his quotations and deliver them to his plant. Arrangements with private operators vary all the way from definite brokerage agreements to loose arrangements that leave the dealer free to trade as he sees fit. Usually the arrangements provide that the dealer shall operate more or less as an exclusive buyer for a particular packer. Under the third method hogs are merely bought from farmers or their organizations when they see fit to make deliveries. Occasionally a local association makes a definite agreement to ship regularly, sometimes with and sometimes without an agreed-upon price basis. Usually the packer quotes his prices by grades and accepts delivery of all kinds of hogs.

A major problem of any manufacturer is the securing of the kind and quantity of raw material best suited for the production of his products. So it must be with packers. As the consuming public has become more discriminating and fastidious in buying meat, the raw material requirements of the packers have become more exacting. In order to secure the desired kind and quantity of hogs packers must have either an adequate supply of all kinds from which to select or contacts with sources of supply that enable them to buy acording to their requirements. Other things being the same, the method of direct buying whereby the packer avoids over- or under-supplies of given kinds and qualities of hogs will be preferred. Methods employed by most packers, which they no doubt consider most practicable and efficient under existing conditions, must at times leave much to be desired in this respect. While they are, of course, able to control their supplies in a general way and even quite definitely, by adjusting their quotations up or down, the marked fluctuations in their prices would indicate that they are not entirely able to avoid over- and under-supplies. In order to get the particular kinds of hogs they want they must frequently accept other kinds in larger numbers than they prefer.

The question of quality and condition is most important in country buying as it is in buying at public markets. Packers may be able to select hogs better when buying in the country. Although they must accept all kinds, their buyers may come to know where the better hogs come from so as to identify them in the trading. Especially is this possible when a good trade may be worked up with farmers and farmers' agencies. A group of local livestock marketing associations are at present negotiating with packers buying hogs in Iowa for a more satisfactory basis of grading and trading in hogs. One of the local packers has already proposed a plan to the cooperative shipping associations "whereby the packers would purchase hogs from the producer on a basis of dressing yield instead of taking them at so much a pound on the hoof as at present.[7]

[7] Des Moines Register, December 14, news item headed "New System for Hog Sales Stressed Here." This plan was proposed by a representative of an interior packing company in an address before the annual meeting of the Iowa Cooperative Livestock Shippers' Association, December 13, 1928. Explaining the disadvantages of buying

In the light of this, it may be suggested that the packer will be best supplied when sellers are able to fill his orders according to his definite specifications. He could then secure just what he wanted on a definite competitive basis. The only sellers really in a position to do this, with a product like hogs that cannot be very closely graded on the hoof, are the producers themselves. Such a system would be direct selling by farmers rather than direct buying by packers. Farmers, through cooperative agencies, may perfect a system for selling in this way. In fact, in the eastern Corn Belt states, particularly in Ohio, several county associations with large numbers of hogs are already marketing hogs in this way. The Eastern States Company with headquarters at Columbus was organized by farm associations to develop this business. The Fayette Producers Company, Washington Court House, Ohio, has perhaps, developed this method of marketing most successfully.[8] It, as well as other similar associations has demonstrated the remarkable economies of it. Cattlemen's associations of the West have formed agencies for the direct marketing of cattle that function in much the same way..

But direct marketing of hogs, either as direct packer buying or as direct farmer selling, has developed to the extent that it has only as limiting factors have been overcome in the improvement of rural transportation and general progress in the local livestock trade. A relatively efficient and well-adapted transportation system is indispensable to the assembly and concentration of stock in sufficient volume for economical operation. Railroads west of the Mississippi River have granted reloading privileges at strategic points on their lines to hog concentrators. Under these privileges

hogs on the hoof—disadvantages to both the farmer and the packer—he presented the results of a test that had been made at his plant. A test lot of 86 hogs, purchased from 13 farmers was slaughtered and a complete record of yield kept of the lot of each farmer as well as of each animal. These hogs had all been placed in a single grade by a grader who was instructed to be especially particular with the grading. In spite of this, on the basis of yield there was 9⅛ per cent difference between the value of the lowest lot and the highest lot that the grader had placed in the same group. At the price, $8.50 cwt., there was a 63-cents per cwt. overpayment on a lot of six hogs purchased from one farmer. On the other hand, there was an under payment of 53 cents on six hogs purchased from another farmer, 46 cents per cwt. on a lot of seven hogs from still another farmer, etc. The price actually paid failed to return to the farmers what their respective hogs were worth to the packer, in some cases by quite an amount.

[8] Organized in 1921 by farmers of Fayette County, Ohio, the Fayette Producers' Company has gown rapidly until in 1927 it handled 2124 decks of livestock, of which 74 per cent was sold directly to packers.

concentrators may receive hogs from shipping points on their lines, unload them for sorting and grading and reship them on a through billing from point of origin. With these privileges several concentrators in Iowa were able to establish profitable business, although most of the reload stations were packer buying stations. The advent of the truck and the progress of road building have greatly facilitated the essembly and concentration of hogs. With these developments country buying became much more economical. Transportation of hogs by truck has rapidly spread throughout the central States, expanding greatly the scope of operation of hog concentrating agencies. Within a radius of 50 miles the truck has proven itself to be admirably adapted for transporting hogs from farm to packing plant or concentration station.

Along with improved transportation have come other significant developments in the local livestock trade conducive to direct marketing. Communication is nearly as instaneous throughout the countryside at the present time as in the urban centers. Market news is as available in the open country as in the trading centers. And the market news that may be had now in the most out-of-the-way places, is, thanks to the splendid work of the United States Bureau of Agricultural Economics, relatively complete market information. The result of this developing technique of market information has been to bring the most remote hog producing localities into the hog market. The local trade is now in a position to take advantage of marketing opportunities. It is no longer dependent for a place to sell upon the vicissitude of a single market center. It may be much more selective and discriminating in disposal practice. Opportunities to reduce risks and uncertainties may be recognized. Farmers and local traders are on the look-out for them. Except for the evolution in the local livestock trade direct marketing of hogs could have gained little headway. In a large measure direct marketing is only a concomitant.

From the viewpoint of the local trade direct marketing of hogs has appeared in general to be an opportunity to be exploited although it has been the cause of uncertainty and dissension. Widespread dissatisfaction with the local dealer

system resulted in the shipping association movement, which by 1920 had covered the Corn Belt States. As their name implies they were not sales organizations, being only agencies designed for joint shipment of stock to public market centers. Local dealers finding themselves out of favor and their business impaired bestirred themselves for better market returns. Their margin could no longer be protected simply by reducing prices to the farmer. Through shipping associations farmers could secure as good a return from the public markets as they. While something could be accomplished through more skillful shipping, shipping association managers, with no previous marketing experience, found little difficulty in developing equally efficient methods. In this situation stock dealers were on the lookout for better trade connections, finding them in many instances with packers and concentrating agencies. As such connections proved profitable they were widely sought by the more alert dealers, who thereby were able to pay prices high enough to hold and even expand their business. Shipping associations in their turn have been put to it to hold their patronage and are finding it more or less difficult to do so except as they are able to take advantage of the local packer demand. The result is that cooperative marketing in the local livestock trade is taking on new aspects as the local associations discover the economies of direct marketing and the technique required for exploiting them.

Conclusion

In this paper we have attempted to outline the conditions under which direct packer buying of hogs has developed rather than to discuss the many trade problems to which it has given rise. Clearly it is not an invention that must soon supercede the centralized market system for it is likely that many slaughterers will always find it most convenient and satisfactory to secure all or a part of their supplies at these centers and many farmers and dealers will find the central market places most satisfactory outlets.

Yet in general its development has occurred in response to economies that packers have been able to realize under

the shifting competitive conditions in their industry as well as to changing conditions in the local hog trade. Country concentration of hogs has become feasible and economical in many areas and competitive conditions in the packing industry have led various packers to take advantage of it. In doing so they have not exploited the local hog trade as it is sometimes alleged. Quite the contrary has been the case. In many communities where direct marketing is practiced local hog prices are well above the level for shipping to the public market centers a good deal of the time. In order to secure hogs in the country, packers and concentrators have been obliged to bid higher than shippers considered they might realize by sending the hogs to a market center. This they have been able to do in many communities.[9]

But price alone is not the only inducement to farmers and country dealers in direct marketing. Their market risks are greatly reduced. Hogs can be sold while they are still in the feed-lot when prices appear most favorable, thereby avoiding the risks of glutted markets and the uncertainty of demand in public market trading. While packers have developed country buying to reduce their raw material risks, farmers may take advantage of it to avoid the risks of market distribution of a perishable product. Certainly the direct marketing will continue its growth in the hog trade as rapidly as an efficient technique for it can be perfected.

Direct marketing is a challenge to hog producers. Its efficiency is limited until it brings producer and packer together in a satisfactory trading relationship. In order to secure a more satisfactory source of supply packers have extended their buying into the section where hogs are produced. There they must deal with the producers on a satisfactory basis if they are to secure the kind and quality of

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[9] A typical case may be cited. A private concentrator in Iowa furnished the following information in regard to his prices. For hogs delivered to his station he aimed to pay 35 cents under Chicago prices. This basis he claimed netted his shippers about 8 cents more than they could realize by consigning their hogs to the Chicago market. Expenses from a given point in his territory, selected for example, to his station amounted to 23 cents per cwt.—freight 14 cents, shrink 6 cents, feed 3 cents. From this shipping point, then, hogs delivered to the concentration station brought prices 58 cents under Chicago prices. Such prices were 8 cents above those that shippers could realized from Chicago consignments because expenses on Chicago consignments from this point amounted to 66 cents—freight 28 cents, shrink 15 cents, feed 8 cents, commission 9 cents, yardage 5 cents, switching and insurance 1 cent.

At the same time this concentrator was delivering hogs to a Chicago packer at prices per hundred pounds approximately 9 cents less than prices at the Chicago stockyards.

hogs in the number desired. But such a basis of trading cannot so well be established with individual producers as with groups of producers in well-organized agencies. Progress in this direction is already great enough to furnish ample testimony of its efficiency.

Moreover, direct packing buying itself does not necessarily bring to the farmer a more satisfactory market. Packers are most likely to buy hogs in any given community with some reference to the competition at that point. There can be no guarantee to the farmer that prices will be in accord with full market value at his farm unless he can recognize such values and be prepared to deliver his product where it is worth the most. Most of the concern in farm circles over direct marketing involves this point. The danger of a buyer's market in the local hog trade is feared in many communities. But where there is a means of protection there is security and farmers have the means at hand in their marketing associations. The possibilities of direct marketing should be sufficient challenge for them to meet the packer at least half way in the development of a more satisfactory livestock marketing system.

Discussion by George F. Henning

Ohio Agricultural Experiment Station

In discussing Professor Miller's paper my statements will be of a nature principally supplementary to what has been said. Further, in this short time, it is not possible to discuss all the phases of "Direct Packer Buying in the Marketing of Livestock."

The paper just presented clearly shows that direct-to-packer buying is an important part of our livestock marketing system and is most important in the Corn Belt. The change in livestock marketing has been greatest in the western and northwestern part of the Corn Belt. With this change has come a larger percentage of hogs which have been purchased through packer buying agencies rather than through organizations or agencies which are direct selling. This phase should be expanded.

It has been the packer buying agencies which have generally brought so much condemnation by the various livestock marketing interests. This has not been true to such a large degree with the direct selling organizations. The former have a tendency to adopt trade practices which incur the wrath of livestock producers.

One of the common practices adopted by the buying agencies is to pay a very good price in comparison with the terminal markets for one particular grade of hogs, and to discount the price severely on the hogs which fail to

make the select grade. This is done in most cases no doubt to discourage delivery of hogs which are not of a grade demanded by the packer outlet, for many packers demand a very select grade of hogs. However, many believe this practice is to increase the margin and revenue of the buying agency. It does mean that livestock producers must meet the select grade demanded, or take the discount on the off grades, or dispose of the off grades to another livestock marketing agency which is more nearly in line with other markets.

On the other hand, the direct selling agencies may have a very favorable outlet for a select grade for a particular period and reflect this to the livestock producers. The price on the other grades is reflected to the producers on a basis justified by the livestock markets. The direct selling agencies more uniformly practicing this latter policy have been the farmers' own livestock associations.

The one association which has been very successful and with which I am most familiar, is the one mentioned in the preceding paper, The Fayette Producers Company, of Washington Court House, Ohio. This organization has developed not only an outlet for a particular select grade, but for several grades, and consequently markets the hogs for the producers in that territory to very good advantage.

One of the practices adopted by this association as well as by some others is "selling on yield." This was briefly discussed by Professor Miller. In reality when the packer buys hogs he is purchasing hams, loins, bacon and the other saleable products. Selling on yield is one of the steps that must be considered. What a hog is in the cooler of a packing house is more nearly representative of what it will bring "over the block" than standing on its four legs in the stockyards. Men skilled in the art of grading hogs say that it is difficult to estimate the yield from live animals at the time of grading. It is much easier "to guess" the live weight. Selling on yield is similar to but not exactly like selling milk and cream on the butterfat test.

Milk and cream marketing made a big step forward with the adoption of the butterfat test. Whether selling on yield will be a similar helpful step in marketing hogs remains to be seen. Selling on yield is not as easy of application as the butterfat test although that had its difficulties.

A few of the obstacles in selling on yield may be briefly mentioned. First, what shall the basis of settlement be? The packer wants the yield high, the producers want it reasonably low. Some compromise yield has to be agreed upon. Second, some packers want to deduct for a low yield but do not want to pay for yields which are above the average, those that are high. A practical workable method is difficult in such a case. Third, there is seasonal variation in yield, and year-to-year variation. The packer is willing to raise the yield for basis of settlement, but is not so willing to lower it for the periods of low average yields. Fourth, there is the question of authenticity of the yield. Has the packer returned the correct yield? There is always the possibility of mixing with other hogs that have been purchased. The shortage question comes up—one or more hogs disappear. Other problems of authenticity appear in the practical day-to-day marketing. Fifth, the time of slaughtering hogs sold on yield is a big factor. Should the hogs be slaughtered the third, fourth, or what day after shipment? If hogs are not slaughtered within a

reasonable time after shipment the shrink is heavy with a resulting low yield. Sixth, the livestock producers don't like the settlement when the yield is low. They kick like mules. They gladly accept a high yield with the accompanying premium, but it is another story when the price is heavily discounted. These are some of the questions which are faced in the working out of this method of direct marketing. Of course there is a common ground of settlement but the difficulty in practical application is to get both the packer on the one hand, and the direct marketing agency on the other, to agree upon the common ground basis.

Progress, however, is being made. Both the packers and the direct marketing agencies are better understanding one another. Indications are that others may attempt it. One packer has agreed to settle on the basis of the seasonal

TABLE 1. SEASONAL VARIATION IN YIELD OF HOGS ADOPTED BY ONE PACKER

Month	Yield for hogs weighing[1]		
	200–225 pounds	225–250 pounds	250–275 pounds
	Per cent	*Per cent*	*Per cent*
Jan., Feb., Mar., Apr.	76½	77	77½
May, June	75½	76	76½
July, August	75	75½	76
Sept., Oct.	74½	75	75½
Nov., Dec.	75½	76	76½

[1] All weights on basis of hot weight shrunk 2.5 per cent.

variation in yield shown in Table 1. Other more desirable agreements will no doubt be worked out.

Selling on yield is no doubt based more on quality than other forms of livestock marketing. The livestock producer is more nearly paid for what he produces. Good livestock men are remunerated for their methods of production; poor methods are discounted.

Selling on yield brings the producers a step closer to knowing what the consumers want in that the packers' requirements on weight, grade and quality are reflected to a greater degree to the direct selling agency and then in turn to the livestock producers. To me this is desirable in marketing.

Another point may be briefly mentioned concerning direct-to-packer marketing. We now have a commendable system of market reporting of livestock prices and related information, so far as it applies to terminal livestock marketing. This information is broadcasted and telegraphed to all livestock interests over the country. Today the producer is better informed about the livestock markets than was the livestock dealer ten years ago. However, with the increase of direct-to-packer marketing the problem of securing this complete information on all livestock marketing becomes more serious. Very few of the direct-to-packer marketing agencies are furnishing any information on prices and receipts of hogs moving direct. This information should be reported to the market news reporting service of the Bureau of Agricultural

Economics. However, to secure this information is difficult. It is another story. Direct-to-packer marketing agencies must be better informed than agencies shipping to a terminal market. The securing of this complete livestock marketing information in the future merits the serious consideration of all agencies concerned.

To me the phase of direct marketing, selling hogs on yield, is the most hopeful part of the system. With a better understanding by the producers, with proper administration and correct return of the yields secured and with a better understanding of the problems, much good may come from this part of direct marketing. However, it might be summed up in a manner similar to President-elect Hoover's statement regarding prohibition. "It is a noble experiment."

Discussion by R. C. Ashby

University of Illinois

Dr. Miller's excellent paper contains a number of pertinent suggestions, of which I shall mention only six. These are, 1. The rapid increase in the volume of direct marketing of hogs; 2. the fact that the extent of direct marketing is not completely revealed by available data; 3. changing competitive conditions in the packing industry, with possible further decentralization; 4. availability of immediate market news service in any locality; 5. proposals to market direct on a dressed yield basis; and 6. the caution that farmers marketing direct may expect to share the "economies that packers have been able to realize" only if they develop methods of direct marketing that enable them to command it.

With reference to rate of increase of direct marketing I have transposed Dr. Miller's statement of percentage differences into a form of percentage difference stated as a percentage of the initial sum. Stated in that manner the increases are startling.

Dr. Miller's showing of a 46 per cent increase in direct marketing in the United States in the four years 1925-1928, of a 33 per cent increase for 8 Corn Belt States for the same period, and a 30 per cent increase for Iowa in the 3 years 1925-1927 may be termed an evolution in hog marketing. It looks more like a revolution.

His paper suggests that the data on direct marketing do not include "direct" shipments to market centers. That is important, both from its direct relation and because of a possible effect of such "directs" on the central markets. Estimating 900,000 directs received at Chicago for 1928 and assuming only 500,000 of them Iowa's, that is equavalent to an additional 10 per cent of Iowa hogs moving direct, and there is also quite a different angle to this. These directs are regularly included in the market receipts as reported for Chicago. Estimating 8½ million hogs for Chicago this year (including 900,000 directs), the 900,000 directs represent over 10 per cent of the total receipts. Outside points usually are not advised as to the portion of Chicago receipts composed of directs. Even hog salesmen in the Chicago yards often do not get that information until the day's market is about over. To be more explicit, it appears that during this year directs have often made up 25 per cent of the Chicago daily receipts; at times well

over 30 per cent. It may well be asked whether sellers' interests would not be better served if only hogs actually on sale were reported as market receipts.

Changing competitive conditions, with some degree of decentralization, are apparent. Is direct marketing, as it has appeared to date, incidental to a struggle between groups of packers? Are farmers, in their attitude toward direct marketing, simply taking sides in such a contest or are they consciously developing a new marketing method? What is the significance of such a contest as regards the future of the national packers? Under present seasonal marketings this group renders a most important service in buying and storing surplus hog supplies. If such service should not continue available would not a considerable reorganization of marketing methods be compelled?

In connection with his reference to universal availability of market news service I am not clear as to Dr. Miller's intent in his mention of sellers being "no longer dependent upon the vicissitude of a single market center"—whether he has in mind that they are no longer dependent upon a single market as a price-basing-point or simply that more selling points are now available than formerly.

Proposals to sell on dressed yields sound attractive. But if that basis be adopted on a big scale what additional machinery must be provided? Ownership identifications, accurate scales, honest weights and correct returns are not provided automatically. Sellers must leave those matter entirely to the packers concerned or they must develop agencies to assure satisfactory service in those respects. Even now difficulties are not infrequent in the apparently simple matter of allocating premiums on hogs from free areas, with tattooing required on all lots. A somewhat comparable situation is the experience of certain milk producers' and milk distributors' associations, where employment of disinterested testing agencies has been found either necessary or desirable.

Dr. Miller aptly observes that heretofore farmers' livestock shipping associations have not been selling agencies. Later he emphasizes the futility of farmers expecting to share in the expected economies of direct marketing to a greater extent than efficiency of their own selling organization can collect. Every State has examples of the difference in results secured by "selling" organizations in contrast with "price-taking" agencies. Thus far the "selling" has been done at the terminal markets. Hogs moving direct have mostly been marked above or so much below some terminal market price.

In view of developments to date one question may well be raised. The trade has regarded Chicago as the basing point for hog prices. Even as far East as Ohio direct hog marketing has, in several instances, been based directly on a Chicago differential. Is the Chicago market still a satisfactory price basis? If not, what basis of price is being substituted, or may be developed?

Finally, it is important that prejudice be eliminated in considering this question of direct marketing. Farmers' interests are in marketing efficiently their annual hog crop. They can afford to take sides in any contest between packers only when by so doing they may further a more efficient hog marketing system.

Discussion by H. Bruce Price

University of Minnesota

It is indeed refreshing to hear this excellently prepared paper which Professor Miller has just read because of the reassurance that it gives us that economic laws are still functioning in the development of direct marketing of livestock in spite of the opinions that are being expressed and widely circulated to the contrary. It is also encouraging to learn that the careful study that the economics staff at the Iowa State College has given this subject in recent years not only reveals that economic laws are operative but that some of the economic causes most frequently mentioned even by some prominent members of the livestock trade are not true. The dependence of the extent of direct buying upon the size of the hog crop is a case in point. The continued and rapid growth of direct purchase of hogs by slaughterers in eight of the principal hog producing States since 1920 in spite of an expanding production, as mentionad by Professor Miller, seems to be adequate refutation of that argument. Such errors in judgment, it should be pointed out, are likely to exist in the infancy of any development in an important industry because of the lack of adequate information as a basis for forming conclusions. They are especially likely to be found in such industries as livestock where production is carried on under widely diverse conditions and the marketing organizations are well developed. Whatever the causes for these misunderstandings may be, however, this paper is a real challenge to the livestock trade and research workers to overhaul the thinking that has been done on the subject of direct marketing of livestock with a view of discovering the fundamental economic factors that are responsible for the movement.

A second important deduction that may be drawn from this paper is the largeness and complexity of the research problem involved in direct marketing of livestock. Both by statement and by implication Professor Miller has pointed out other possible economic causes of the movement which he has not discussed, either because of lack of time or availability of information, and which open up new fields for research. On the one hand are the problems dealing with changes in the meat packing industry, and on the other hand are new developments in marketing. Probably an analysis of the former will contribute more to a better understanding of the economic forces that are responsible for the movement than an analysis of the latter. I believe that this statement is true of any study of direct marketing in the Corn Belt since there seems to be here a close relationship between the decentralization and westward movement of the meat packing industry and the extent of direct marketing. Outside of the Corn Belt development of the marketing organization may be more important. I presume that changes in the structure of livestock markets, as development of better grades and quotations, and cooperative organization, may be important contributory causes for the direct selling of feeder lambs and cattle of the great plains and Pacific Coast States, or the direct marketing of feeder cattle by ranchmen in the Southwest.

A microscopic examination of the effect upon the technique of marketing should also be included in any comprehensive program of research in this field. Professor Miller has pointed out some of the considerations which influence the packers' choice in direct buying and the shippers' choice in direct selling. We may very properly inquire further into the effects upon buying and selling policies, shipping practices, competitive conditions in both the local and central livestock markets, or upon the cooperative movement in its various forms. I hestitate to suggest the possibility of comparing prices received for livestock marketed direct and through the regular marketing channels because such comparisons are likely to be misleading where grades are as poorly standardized as for livestock, although price analyses of some significance may possibly be developed in connection with research in this field.

These remarks merely serve to emphasize the large number of aspects of direct marketing and some of the different lines of research that must be completed before the economics of this new movement in livestock marketing are fully analyzed. The possibilities of research as suggested by Professor Miller's paper should stimulate those of us who are interested in research in this field to new efforts to take advantage of the opportunities that are here presented to obtain a better understanding of the economic issues of one of the most important developments in agricultural marketing of recent years.

PROBLEMS IN THE LOCATION OF COUNTRY MILK PLANTS

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Over 70 per cent of the milk produced in New York State is delivered to country plants. In 1927, the State Department of Agriculture and Markets listed 1,330 plants which received milk or cream directly from farmers. The approximate number of plants of each type and the relative quantities of milk handled are shown in table 1.

TABLE 1.—MILK PLANTS IN NEW YORK STATE

	Number of Plants	Milk handled per plant (million pounds)	Percentage of Total
Shipping Stations:			
To New York market	550	5.0	50
To other cities	70	5.0	6
Condenseries and Powder Plants	75	12.5	18
Feeders	35	3.0	
Cheese and Butter Factories	350	2.5	15
Local retail plants	250	2.5	11
Total	1,330	4.3	100

The 550 milk stations which ship to the New York market handle about one-half the milk that reaches the country plants of all kinds. Most of the 75 condenseries and powder plants also ship milk or cream to New York part of the year and in addition convert large quantities of skim milk and whole milk into more concentrated products. Including the milk stations, condenseries, and feeders, there are in New York about 730 country plants which ship fluid milk and cream. The present discussion is limited to these plants.

Factors Considered in Locating Plants

Country shipping plants have been established by various agencies including city milk distributors, transportation companies, companies manufacturing condensed milk and

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milk powder, farmers' cooperative associations and independent shippers of milk and milk products. Some of the more important considerations that have determined the locations selected for plants follow:

1. Shipping facilities, service and rates. This applies to materials shipped in as well as to milk and milk products shipped out.
2. Cost of site and rights of way, and costs of constructing the plant and providing such facilities as water supply, sewage disposal and railroad switch.
3. Probable volume of milk obtainable at reasonable prices, as determined by present and prospective production in the tributary area, by road conditions, competition and the like.

These three considerations may be summarized as one objective—namely, to obtain a supply of milk at minimum cost delivered to the market where desired.

4. Revenue to the transportation company. In the case of plants established by the railroads and express companies, the primary motive was more revenue-producing traffic. However, these agencies necessarily gave consideration also to the conditions that determine the operating efficiency of the plants.
5. Service to the producers in the area tributary to the plant. Attention to this feature has, of course, been limited chiefly to the producers' cooperative associations.

In general, these considerations have led to the establishment of milk plants in the most desirable locations. Many plants have been established in unfavorable locations. Some of these have been eliminated and most of those which continue to be operated are valued at only a fraction of the original investment.

The important problem in milk plant location in New York at present, however, is not the relocation of plants already established, nor the selection of desirable sites for new plants. It is rather the elimination of plants which have been located where econonomical operation is impossible, or where, because of changed conditions they are no longer required for the convenient and economical handling of the milk.

Conditions Favoring Elimination of Some Plants

Changes during recent years in conditions affecting the costs of plant operation, country hauling, and transportation by rail, favor the elimination of many country plants, particularly those which receive only a small volume of milk. The more important of these changes are:

1. The development of lower priced, more economically operated, more dependable motor trucks and their increasing use for hauling milk. A recent study in New York State revealed that nearly half of the dairymen were sending their milk on commercial routes, of which over three-fourths were truck routes. About half of the dairymen who hauled their own milk used autos or trucks.
2. Greatly increased mileage of hard-surfaced and other improved roads.

In sixteen counties of New York State for which satisfactory records are available, the mileage of improved roads increased from 11 per cent of the total in 1915 to 30 per cent in 1928. The percentage of hauling on improved roads has increased much more than the mileage. The roads with most travel have been improved, and having been improved, still more traffic is routed over them. Two-thirds of the milk hauling from 5,900 farms in 1924 was on improved roads. Good roads and trucks have greatly extended the limits of economical hauling.

3. Higher costs of plant construction, higher wages, and higher standards of sanitation.

These have resulted in much higher "fixed" costs of plant operation. Consequently, plants handling a large volume of milk now have a greater advantage than before in respect to unit costs of operation.

The effect of volume upon the unit costs of plant operation are shown in Table 2. The average cost per 100 pounds of milk in these 38 plants was 22.9 cents. This does not include the central office expenses for supervision, accounting, inspection service, and the like. The large plants handled milk for 13.3 cents less per 100 pounds than did the small plants. This difference would amount to about $120 a year on the milk from a 15-cow dairy.

TABLE 2.—RELATION OF VOLUME OF MILK TO OPERATING COST PER 100 POUNDS IN THIRTY-EIGHT RAW MILK PLANTS[1]

	Volume of milk handled per plant		
	Less than 4,000,000 pounds	4,000,000 to 8,000,000 pounds	Over 8,000,000 pounds
Number of plants	14	12	12
Average volume:			
Pounds per year	2,784,331	5,471,687	13,629,208
40-quart cans per day	90	176	439
Cost, Cents per 100 Pounds of Milk, for			
Land and buildings	6.4	4.3	2.6
Equipment	4.0	2.7	2.3
Direct labor	11.9	9.9	8.5
Supplies	8.1	5.7	3.9
Miscellaneous	2.5	2.6	2.3
Total	32.9	25.2	19.6

[1] Tucker, C.K., The Cost of Handling Fluid Milk and Cream in Country Plants, Bulletin 473 Cornell University Agricultural Experiment Sta., 1929.

The 12 largest plants handled 4.9 times as much milk per plant as the 14 smallest plants, but the costs of operation were only 2.9 times as great. Even the cost of direct labor increased in smaller proportion than the volume of milk.

4. Higher freight rates and greater differential between carlot and l.c.l. rates.

Changes in freight rates on milk since 1917 are shown in Table 3.

TABLE 3.—FREIGHT RATES ON MILK TO NEW YORK FROM 201-210 MILE ZONE

Year	L.c.l.	Carload	Difference
		Cents Per 40-Quart Can	
1917	30.4	26.6	3.8
1928	45.5	39.8	5.7
Increase	15.1	13.2	1.9
		Dollars Per Carload	
1917	76.00	66.50	9.50
1928	113.75	99.50	14.25
Increase	37.75	30.00	4.75

The difference between the carload rate and the l.c.l. rate from the 201-210 mile zone is now 1.9 cents more per can and $4.75 more per carload than it was in 1917. The difference between carload and l.c.l. rates on milk from the 401-410 mile zone is 7.6 cents a can or $19 per carload. Because of the wider spread between the carload and l.c.l.

rates, and because of the longer hauls that are necessary to supply the market, there is greater opportunity for saving expense by shipping milk in car-lots. However, more than one-half of the milk is actually shipped at l.c.l. rates.

5. Development of insulated tank cars for shipping milk.

Although, in the New York territory, no special freight rates have been quoted on milk shipped in tank cars, there are considerable savings in refrigeration expense and in labor when tank cars are used. The capacity of each tank car is more than double that of the ordinary milk car and very few of the country plants operating in the territory at present are large enough to ship milk in tank carloads. Carload rates are obtained in some instances by picking up milk at a series of plants along the line, but this is awkward, and the possibilities are limited.

Progress in Eliminating Non-Essential Plants

Some progress has been made in eliminating inefficient and non-essential plants. In fourteen important dairy counties which were very largely on a fluid milk basis by 1918, the number of shipping stations and condenseries decreased from 319 in that year to 262 in 1928. This is a decrease of about 18 per cent.

The plant eliminations which have occurred up to this time are due very largely to the consolidation of smaller firms with the larger milk distributors and the Dairymen's League Cooperative Association. This association now operates about 170 plants in New York State, while the two largest milk distributors in New York City operate respectively 72 and 84 plants. Nearly all of these are fluid milk plants. They constitute about three-fifths of the 550 New York shipping stations shown in Table 1. The Borden Company and affiliated companies other than the fluid milk branch of the business, operate 41 plants most of which are included in the list of 75 condenseries and powder plants. A number of other firms operate from two to ten plants each. Including the plants operated by the Dairymen's League, about 340 of the 730 shipping stations, condenseries, powder plants and their feeders, receive exclusively milk that

is purchased on a uniform price basis through the association.

None of the firms operating chains of country plants has adopted a definite program for eliminating plants which, because of improved roads and trucks, are no longer required. In fact the competition of dealers buying milk independently, between themselves and with the Dairymen's League, has resulted in the construction of many new plants that are entirely unnecessary for the economical handling of the milk.

A large proportion of the plants now operating in the territory handle such small quantities of milk that economical operation is impossible. About one-half of the shipping stations in New York State receive annually less than 4,000,000 pounds of milk each. The costs are much higher in such small plants than in those of larger output. These facts suggest very strongly that many more plants could be eliminated with consequent savings in costs. A survey of the entire State of New York indicates that approximately 355 plants, properly located, would be adequate to handle all the milk which is now handled by 730 plants.

Effect of Eliminations Upon Hauling Costs

A detailed study of milk hauling in one area of central New York provides the basis for determining what effect the elimination of plants, that apparently are non-essential, would have upon hauling distances and costs. This area is now served by 30 fluid milk plants, 2 condenseries, and 5 butter and cheese factories, a total of 37 plants. Both of the condenseries ship fluid milk or cream part of the year. All of the butter and cheese factories are located in communities several miles back from the railroad. The location of all plants and their patrons, also the improved and unimproved roads are shown in Fig. 1.

In some communities the dairymen are dividing their patronage between two or more plants, and in many instances the milk is not delivered to the nearest plant.

At the top of this map, the patrons of plant number 7 are intermingled with those of plants numbers 6 and 8. A number of farms within one-half mile of plant number 8

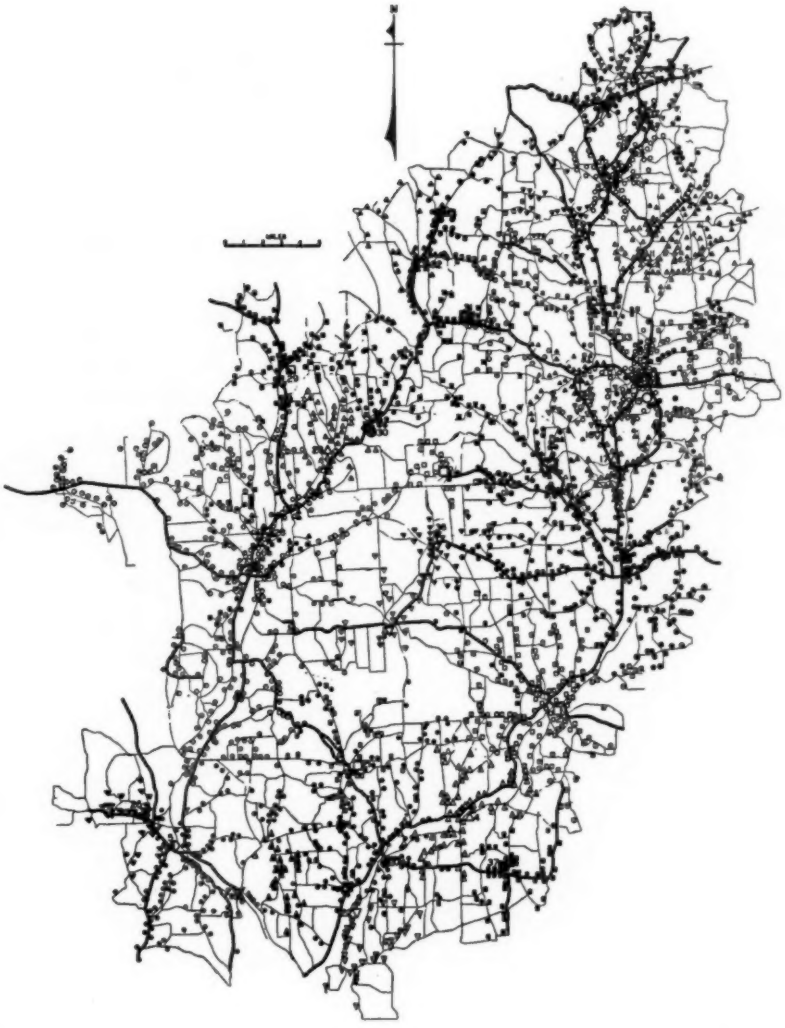

FIG. 1. LOCATION OF ALL COUNTRY MILK PLANTS AND OF FARMS SUPPLYING MILK TO THESE PLANTS IN ONE AREA OF CENTRAL NEW YORK

Milk plants are represented by the larger symbols, farms by the smaller symbols. Improved roads are represented by the heavy lines, unimproved roads by the lighter lines.

The 37 plants receive milk from 2,675 farms. In several instances one community is served by two or more plants. It is also noticeable that some of the farms do not supply milk to the nearest plant.

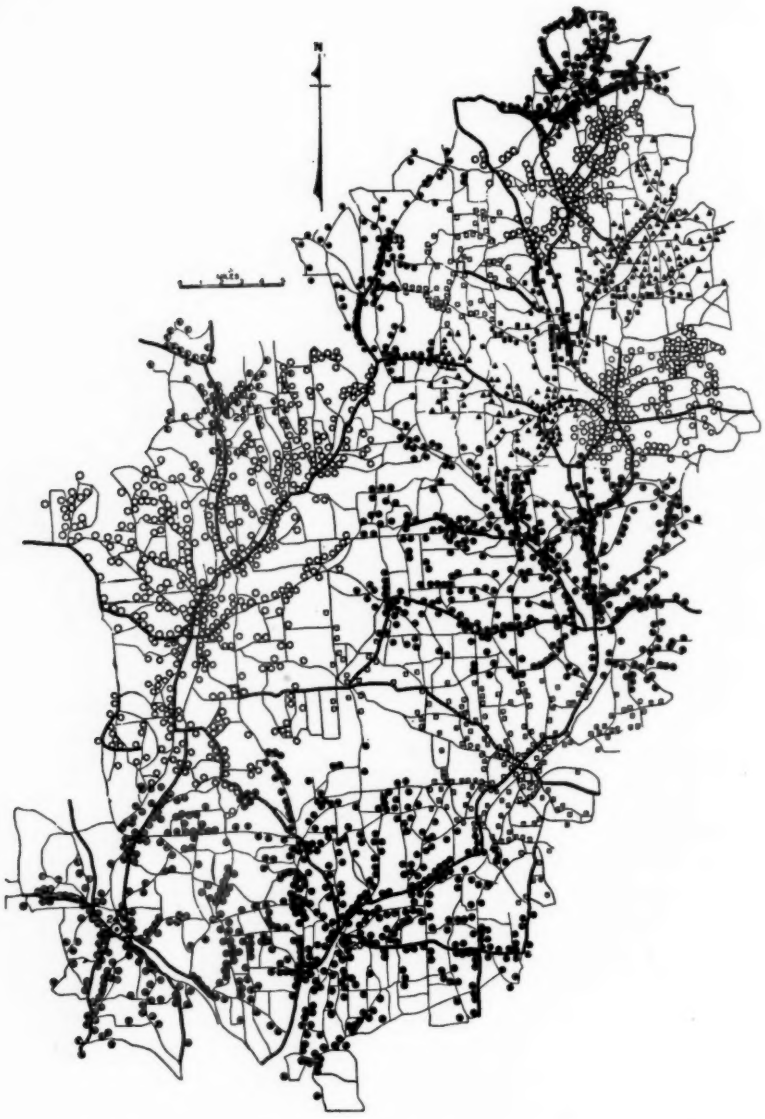

FIG. 2 LOCATION OF 14 ESSENTIAL MILK PLANTS AND OF FARMS FROM WHICH MILK WOULD BE RECEIVED

All farms are assigned to the plant most conveniently reached.

send their milk about three miles to plant number 7 because a higher price is paid there.

Plant number 15, further to the south, receives milk from a number of farms as much as twelve miles to the west whose logical delivery point is either plant number 1 or plant number 31. The proprietors of plant number 15 pay a part of the hauling charges on milk originating west of plant number 1. Numerous other instances could be cited in this area and others, where two or more milk plants are serving communities that one plant could serve as well, and at less cost, considering both hauling and plant operation.

The conditions shown in this map and other facts concerning hauling distances and costs of hauling milk in this area, indicate that 18 of the 30 fluid milk plants could be closed without causing serious hardship to any of the producers in delivering their milk. Butter and cheese factories were not considered in this readjustment. The milk now handled by them will be diverted gradually to fluid milk plants whether or not any of the latter are eliminated.

In Figure 2 are shown the locations of the 14 essential plants and the farms that would supply milk to them, assuming that all other plants, except the butter and cheese factories, were closed and the milk from each farm were routed to the nearest plant. This map represents conditions approximately as they would be if all the milk were controlled by one organization.

Revised hauling distances were calculated from this map. The change in average hauling distances caused by reducing the number of plants from 32 to 14 is shown in Table 4.

TABLE 4.—CHANGES IN HAULING DISTANCES CAUSED BY ELIMINATING NON-ESSENTIAL PLANTS

Change in Haul	Percentage of Farms	Change in Distance		
		Improved Road (miles)	Unimproved Road (miles)	Total (miles)
No change	56			
Shorter Haul	14	—2.2	—0.2	—2.4
Longer Haul	30	+2.5	+ .3	+2.8
All Farms	100	+ .4	+ .1	+ .5

The average hauling distance per farm would be increased 0.5 mile of which only 0.1 mile would be unimproved

road. The average haul per 100 pounds of milk would be only 0.3 mile greater under the proposed system, indicating that the smaller producers are the ones chiefly affected by the elimination of the non-essential plants.

The hauling distance for over one-half of the farms would be unchanged as a result of eliminating the 18 plants. About 14 per cent of the dairymen would have a shorter haul under the proposed system. These dairymen are now hauling their milk an extra distance to get the benefit of a higher price at the more distant plant, or to reach a plant which handles milk sold through the Dairymen's League. Thirty per cent of the dairymen would have a longer haul, if the non-essential plants were closed. The increased haul for dairymen so affected, would average 2.8 miles, including only 0.3 mile of unimproved road.

If no change were made in the methods of hauling, the additional cost of the longer average haul for all farms would be about 2.7 cents per 100 pounds of milk. This estimate is based on the actual costs of hauling milk various distances as determined by a study of hauling costs in this and other areas in New York State. However, the lessening of competition between plants would encourage more cooperative hauling and more commercial hauling. These are practical ways of increasing the size of loads, thereby reducing the unit costs of hauling.

In Table 5, costs of hauling milk by 204 individual dairymen are compared with the average rates charged on 69 commercial routes.

TABLE 5.—COSTS OF INDIVIDUAL HAULING AND RATES CHARGED BY COMMERCIAL HAULERS, PER 100 POUNDS OF MILK

Distance Hauled	204 Individual Dairymen	69 Commercial Routes
	cents	*cents*
1 mile or less	12.6	12.3
1.1 to 2 miles	20.0	12.5
2.1 to 3 miles	23.8	13.2
3.1 to 4 miles	27.1	14.5
Over 4 miles	41.1	20.0

These figures indicate that in general milk can be hauled more cheaply on commercial routes than by individuals, and that the advantage of commercial hauling increases with the distance.

The cost of hauling 100 pounds of milk on commercial routes is much lower when large loads are hauled. The average cost of hauling milk on six commercial routes having average loads of less than 1,000 pounds was 6 cents per hundredweight-mile. The average cost on eight routes with average loads of more than 3,000 pounds was only 1.7 cents per hundredweight-mile, (table 6).

TABLE 6.—COST OF HAULING LOADS OF DIFFERENT SIZES ON 59 TRUCK ROUTES

Size of load	Routes	Cost of hauling		Returned per truck-hour
		Per cwt.	per cwt.-mile	
	Number	*Cents*	*Cents*	*Cents*
10 cwt. or less	6	30	6.0	2
11-20 cwt.	22	20	3.2	27
21-30 cwt.	23	16	2.2	50
More than 30 cwt.	8	14	1.7	70

Under present conditions, as indicated in figure 1, there are numerous instances where cooperative hauling or commercial hauling cannot be done effectively because dairymen living along the same road patronize different plants. Obviously, the closing of non-essential plants would tend to reduce hauling costs by encouraging more cooperative hauling, more commercial hauling and larger loads on the commercial routes. It is probable that this tendency would offset, or more than offset, the tendency to higher costs because of the longer hauling distances that would result from reducing the number of plants.

Effect of Eliminations upon Plant Costs

Of the 14 essential plants, 7 have adequate capacity for all the milk that would be received by them under the conditions illustrated in figure 2. Five plants would require additional equipment including coolers and storage tanks, but no enlargement of the buildings. At two plants it would be necessary to construct a second receiving room and to add more equipment throughout. The maintenance of the additional facilities required at the 14 plants would be small compared with the cost of maintaining the 18 non-essential plants.

Of the 32 plants shipping fluid milk and cream from this area, 13 received from farmers less than 4,000,000 pounds

of milk a year, each, and only 8 plants received more than 8,000,000 pounds, (table 7). The average for all 32 plants was 6,250,000 pounds for the year or 202 cans daily, which is about 30 per cent above the average for all fluid milk plants in the State.

TABLE 7.—EFFECT ON NUMBER OF PLANTS AND VOLUME OF MILK HANDLED

Size of plant (Annual volume in million pounds)	Number of plants		Average daily volume (cans per plant)	
	All plants	Essential plants	All plants	Essential plants
Less than 4	13	1	77	120
4 to 8	11	3	171	228
Over 8	8	10	445	565
All plants	32	14	202	461

If only 14 plants were operated, and the patronage of the dairymen were distributed as indicated in figure 2, only one plant would receive less than 4,000,000 pounds of milk a year, and 10 plants would receive more than 8,000,000 pounds each. The average for the 14 plants would be about 14,300,000 pounds a year, or 461 cans daily.

The study of milk plant costs referred to in table 1 indicates that if the number of plants in this area were reduced from 32 to 14, the cost per 100 pounds of milk would decrease from 25 cents to 19 cents. This saving of 6 cents per 100 pounds of milk or about $47 per farm could not be realized fully at once. Since the 18 plants marked for elimination probably could not be sold readily for other purposes, interest and depreciation on the buildings, amounting to 1.6 cents per 100 pounds of milk, must be reckoned as unavoidable costs. The net immediate saving in costs, then, would be 4.4 cents per 100 pounds of milk or $34 per farm. If depreciation were figured at 4 per cent a year, the unavoidable costs would decrease to zero in 25 years. Thereafter, the full saving of 6 cents per 100 pounds of milk would be realized.

Since the plants in this area are considerably larger than the average, the indicated rate of savings in cost of operation is less than might be expected from eliminating nonessential plants generally.

Effect of Eliminations upon Shipping Costs

Five of the fluid milk plants in this area are off-rail and their milk is shipped with that of other plants. Of the 14 essential plants only one is off-rail, and its milk is shipped with that of another plant. If all the milk were shipped from the 27 stations in 40-quart cans, about 61 per cent could be shipped at carload rates. The other 39 per cent would have to be shipped at l.c.l. rates from plants, where during at least part of the year, the daily shipments are less than the minimum carload of 250 40-quart cans. If all the milk were shipped from 13 stations, 88 per cent of the milk could be shipped at carload rates. The carload rates are ⅛ less than the l.c.l. rates, but some extra expense is involved for the shipper, who is required to load and ice the carload shipments. The railroads ice and assist in loading l.c.l. shipments.

Approximate costs of shipping the milk from 27 stations and from 13 stations are compared in table 8.

TABLE 8.—APPROXIMATE SHIPPING COSTS

Item	From 27 Stations	From 13 Stations	Difference
Volume of milk shipped in carloads per cent	61	88	+27
Shipping cost per 100 lbs. milk, cents			
Freight	54.32	52.34	— 1.98
Other costs	2.48	3.63	+ 1.15
Total	56.80	55.97	— 0.83
Cost per farm, dollars	445.31	438.80	— 6.51

[1] The estimated cost to the shipper on carload shipments in addition to freight charges is $11.30 per car; ice 3.8 tons @ $2.50; labor for putting in ice, loading milk and unloading empty cans, 4½ hours @ $.40.

Only a small saving in shipping costs is indicated by these figures. However, the estimated reduction in costs is very conservative for the particular area under discussion, and much too low for the territory as a whole. Since the plants in this area are larger than average, the increase in percentage of carload shipments is less than could be effected in most areas by closing the non-essential plants. Plant labor for loading and icing cars has been charged at the average rate of wages paid, although in most instances there would be no additional expense for labor, if more of the milk were shipped in carloads.

The freight rates used in this computation (table 8), are those applicable to the 250-260 mile zone. The difference between carload rates and l.c.l. rates increases with the distance, although the costs of loading and icing are not appreciably greater in the more distant zones. Therefore, in the districts further from market, there is greater opportunity for reducing shipping costs by assembling milk at fewer stations.

Savings in shipping costs, due to having a larger proportion of carload shipments would be much greater when tank cars are used. Since these cars require no ice and very little labor for loading, the shipper can save almost the entire difference between the carload rate and the l.c.l. rate. When milk from the area under discussion is assembled at 27 shipping points, only 582 full tank carloads can be shipped during the year. If the milk were assembled at 13 stations 1,219 full tank carloads could be shipped.

Obstacles to Elimination of Non-Essential Plants

The foregoing data indicate that the elimination of many country milk plants is feasible, and would result in considerably lower costs of plant operation and transportation.

The question naturally arises as to why the proprietors of the milk plants have failed to take advantage of the opportunity to reduce their costs. The most important reasons for their failure to do so, are as follows:

1. Intensified competition for milk as the demand for fluid milk and cream in the New York market has come to absorb the entire available supply during the season of low production.

In their attempt to obtain adequate supplies of milk, the larger distributors and the Dairymen's League have continued to maintain many plants, and have opened new plants which, considered by themselves, are uneconomic units, and unnecessary for the convenient handling of the milk.

2. Failure of the milk plant proprietors to recognize fully the possibilities of reducing costs by assembling milk at fewer shipping points.

3. Opposition of producers to the closing of plants previously established, and their eagerness to have new plants established in their communities. This attitude is based on personal convenience, community loyalty and fear of monopoly, with every little consideration of the economic aspects of the situation.

The last of these obstacles is the most serious. However, the opposition of dairymen to the elimination of unnecessary milk plants will diminish as they come to appreciate the possibilities of reducing costs and the effect of this upon their net returns for milk. Members of a pooling organization such as the Dairymen's League would benefit directly from any savings made by the organization in this or other ways. Competition between the cooperative and private organizations would cause the latter also to pass on to their patrons at least a part of the savings resulting from the operation of fewer plants.

As previously indicated, the elimination of unnecessary milk plants would result in longer hauls for some of the dairymen. It is suggested that the proprietors of the milk plants assume responsibility for the operation of commercial hauling routes, and establish a uniform hauling differential to be deducted on all milk not delivered directly by the dairymen. This uniform deduction for hauling could be somewhat lower than the average rates charged under present conditions. If this plan were followed practically all of the dairymen would be benefitted by the closing of non-essential plants.

Many dairymen are opposed to the closing of non-essential plants because they fear monopoly. As previously indicated, a large number of fluid milk plants in New York State now are cooperatively owned and a large proportion of the whole number buy milk on a uniform price basis through the Dairymen's League.

Cooperative ownership or control of a still larger proportion of the country milk plants would facilitate the solution of the problem of locating milk plants only where they are needed, and would at the same time safeguard the interests of the producers against the abuses which commonly are associated with private monopolies.

Discussion by Hutzel Metzger

Bureau of Agricultural Economics

I think Dr. Spencer's studies have been especially effective in pointing out some of the obstacles with which milk producers, particularly in the East, have to contend. In locations where milk frequently has to be shipped from 100 to 400 miles, receiving stations are necessary.

It is interesting to note that the results obtained for costs of various sized plants check rather closely with those of the United States Department of Agriculture's study in New England. The conclusion reached for New England was that about a carload of milk per day was a minimum for economically-sized plants. About 85 per cent of the plants shipping milk and cream to New York, Metropolitan Boston and other New England points failed to attain this volume. In addition to factors influencing the location of plants which Dr. Spencer has enumerated I think that, in New England especially, many of the plants are outgrowths of butter or cheese factories, the size of which may not have been so important an economic factor. When the dairy production began to be used for fluid milk a great many of these plants were retained and operated as fluid milk receiving stations.

Dr. Spencer's studies are especially valuable because of their going to the individual producer and studying the question of possible reorganization at the receiving end of the milk business. I think that, speaking of some of the Eastern milksheds, the statement is correct that our problem is not one of where to build plants but of how to eliminate the unnecessary ones. Farther west, where a shift is being made in the direction of more fluid milk, it may be as much a question of where to locate new plants. In sections where the problem is one of location, studies such as these are just as valuable or even more valuable to those locating the new plants than to those eliminating old ones.

It seems that producers are always ready to welcome another competitor in the field, without realizing that they will have to support two agencies instead of one, with little probability of an increase in prices. Once we have sufficient data to convince producers and plant operators of the added cost to themselves and to the industry of these small operations, the easier the adjustment will be. The fewer dealers we have in the country the less difficult becomes the problem. Some of the mergers in the dairy industry during the last year may prove of decided benefit in this respect.

The large cooperative fluid-milk associations, as well as the locals, have given little attention to this phase of marketing. In fact some of them have been the most serious offenders. They have been organized on the basis of giving every member a market for all of his milk all the time. They have gone out and taken in membership regardless of the market requirements or the cost of getting that milk to market. They have given the producer the privilege of withdrawal, which he may use if he finds their service less profitable than that of some other agency. Where the association has the right of cancellation, however, it seldom has been used even after the association discovered that it would be undesirable to continue the membership longer. The result has been, frequently, the operation of plants of the asso-

ciation or of cooperating dealers with a volume so low as to be uneconomical.

I think that increased attention to savings through economical organization by cooperatives will net them far more than they can possibly hope to gain by any bargaining power or market control which they can obtain with the additional milk which would be received through small uneconomical units.

There is, of course, the problem of cost from abandonment, where plants are eliminated, which must be borne by the industry. In most cases the investment in the small plants is low and the equipment already obsolete. All these fixed costs, as well as some additional variable ones, would have to be covered if the plants remained in operation. Even during the period of abandonment, it appears that the savings would be significant, and afterward there seems little opportunity for argument as to the ultimate advantages to the producers.

NOTES

With this issue, the section of the JOURNAL called "Notes" becomes a regular feature, under the general editorship of Professor John D. Black of Harvard University. It is intended to include the following sorts of material:

1. Short bits of theoretical analysis, such as that of the intensive and extensive margin in this issue. It is hoped that most of them will be newer and fresher than this.
2. Reports upon small pieces of research, such as that of Mr. Waugh in this issue.
3. Important side-products of research projects that are out of unity in the regular reports.
4. Preliminary statements of important research results.
5. Reports of results with a particular research method or device.
6. Suggestions of new methods of attack upon problems.
7. Criticism briefly stated of points in articles published in this or other journals, or in new books or important bulletins that are published.

The editors feel that many valuable ideas and results in our field are constantly being wasted because those who have them do not get around to working them up thoroughly. The "Notes" is to be a place where these can be published at once, and where the author can stake out his claim to his intellectual property by signing his name to it.

The notes may be as short as a single paragraph, or as long as a thousand words.

The Editors

RAINFALL AS AN INDICATOR OF NEW ENGLAND POTATO YIELDS

About a year ago a study of potato yields in New England revealed the fact that the forecasts made on July 1 and on August 1 have been unreliable. The reason for this was evidently that farmers are unable to judge potato prospects correctly early in the season. They must, at that time, rely entirely on the appearance of the vines rather than on the development of the tubers. This has resulted in very low correlations between condition as reported on July 1 and August 1 and the yields which were estimated at the end of the season. In a number of cases these correlations are minus, indicating that high reported condition has been more commonly associated with low yields than with high yields.

It was apparent that if the crop statistician must rely wholly on the farmers' condition reports, the early potato yield forecasts are likely to continue to be erratic, and it was therefore plainly necessary to look about for some other indication which might prove more reliable. For that reason a statistical study of weather data has been carried on and has provided an additional method of forecasting yields which has already proved its value during the past season.

Rainfall during the months from May through September seems to explain a large part of the variation of the yields which have occurred during the past fifteen years in all the New England States. Moreover, it is the early rainfall —from May 1 to July 31—which is most closely related to yields. Using State average rainfall figures for these early months and trend as dependent factors related to final yields results in correlations ranging from 0.79 to 0.93 in the six New England States. By using station data on rainfall in the State of Maine the correlation is raised to 0.94. If later rainfall is included in the analysis, these correlations may be increased somewhat, but it is quite evident that they are high enough to provide a useful method of forecasting potato yields early in the season.

The relationship between potato yields and rainfall in all the New England States is minus, showing that the highest yields are obtained in dry years. It is an interesting fact that none of the past fifteen years appears to have been dry enough to cut down the yields, and it is therefore impossible to determine accurately the best amount of rainfall for this part of the country. A three dimension correlation showing the joint influence of early and late rainfall indicates that the highest yields are the result of dry, early seasons followed by a moderate to wet season after August 1.

The results of this study were used during the past season in forecasting yields and resulted in errors of 2.5 per cent on July 1; 1.5 per cent on August 1; 0.3 per cent on September 1; and 0.3 per cent on October 1.

While further refinement of the study is possible, it is now certain that the results can be used in a practical way.

Frederick V. Waugh

This is a report on a study now being completed by the New England Research Council on Marketing and Food Supply and the New England Crop Reporting Service. The study is being conducted by Frederick V. Waugh, Senior Agricultural Economist; Chester D. Stevens, Crop and Livestock Estimator; and Gustave Burmeister, Associate Crop and Livestock Estimator. A preliminary mimeograph has been issued.

THE EXTENSIVE vs. THE INTENSIVE MARGIN

Ask almost any score of senior majors in economics or beginning graduate students to explain the difference between the extensive and intensive margins, and fifteen of them will tell you that one represents the using of a little of labor and capital on much land, and the other the reverse of this. Logically these two margins ought to be opposites, like *intensive* and *extensive cultivation;* but they are very far from being this. Instead of being two opposite degrees of combination of labor and capital with land, they represent the identical degree of combination; but looked at from two different points of

view. The extensive margin concept has reference to the *grade* of *the land* upon which the combination is made; and the intensive margin concept to the *amounts* of the *other productive factors* used with this same land.

It ought not be necessary to say anything further on the subject. Even what has been said ought to be superfluous. But the writer's experience prompts him to keep on. There must be somebody teaching these concepts wrong. There must even be textbooks which are more or less misleading on the subject. In fact, the writer has discovered several such. The most recent is that excellent textbook called the "Economics of Farm Organization and Farm Management" by Professor Holmes, where one will find the statement that the term extensive margin "applies to the process of increasing the total production of agriculture or the total income from any agricultural business unit by the taking on of *more land*" (p. 148. Italics are the writer's). It is certain from Professor Holmes' full statement that he thinks of the intensive and extensive margins as herein defined; but the particular statement quoted will lead many students astray, for students have a way of grasping all our mistakes and missing our best points. They will read it to mean more land used with the present labor and management, whereas what is really intended is to set up the choice between using *additional* labor and capital on the land already in use, and using it on poorer land than that now in use.

Ricardo did in a sense set up the intensive and extensive margins in opposition to each other. He spoke, as above, in terms of a farmer's having a choice between using additional labor on the same piece of land and using this additional labor on poorer land. Others have properly followed him in this manner of thinking. But there is nothing about such a concept which makes the proportion between land and the other factors the basis of distinction between the margins. Ricardo is clear in his use of extensive as associated with the grade of the land; and intensive as associated with the amount of labor applied.

No doubt the confusion has arisen from the fact that we have done our thinking about the extensive margin mostly in terms of agriculture as a whole. The poorest grade of land which it pays to use for any kind of agriculture is *cultivated extensively;* and the better grades whose use competes with that of this poor land are *cultivated more intensively.*

But we must not let this superficial association lead us astray. As a matter of fact, every crop, every combination of crops, every system of livestock farming, has its extensive margin—its grade of land beyond which it does not pay to use poorer land in that particular way. Combinations of enterprises are not discrete, but are almost infinite in degree. Any crop or livestock product or combination of these may exist in an infinite number of proportions to the land factor. For each of these infinite number of enterprise or production-factor combinations, there is a grade of land beyond which any poorer land would not repay its use; and that grade of land represents the extensive margin for that combination. Thus it may be said that the extensive margin is only a way of looking at a combination, from the point of view of the grade of land in it. The intensive margin, on the other hand, has reference to that increment of the other factors of production beyond

which further increments will not pay for themselves, when used on any grade of land. The *combination* is the same whether one is speaking of the intensive or the extensive margin of it.

John D. Black

Harvard University

FARM BUDGETING AND CURRENT ADJUSTMENTS

If farm budgeting is to be useful as should be, it must provide for a proper amount of flexibility. It must assist in problems of farm management as distinguished from farm organization; and of reorganization as distinguished from the initial organization. The kind of records to keep and data to collect in order to construct budgets with the necessary flexibility, has not been worked out yet; and here at Iowa we are giving considerable thought to the problems involved.

It is clear at the start that the records must consider the farm business as a unit, and that they must be of such a nature that they will show the effect of the changes *on the margin*, not the *average effects*. They must also keep separate the effects of the different sorts of changes—such as in farm practices, in types of equipment used, in inputs, in proportions of crops; not combine them into composites like unit costs of production, in which the special nature of the changes is concealed. They must reveal all the important alternatives and relationships between them that exist throughout the year.

The analysis built on such records will not synthesize facts into average figures, but will so arrange them that at any time the farmer can place his finger on each of them individually. Each fact must be considered as a part of a total situation from which it cannot be separated without a change in its character. Usually judgments will be based on an analysis which indicates the advantages to be gained by the new practice and shows the offsetting disadvantages as the change affects other parts of the business. A new analysis will be developed based on the facts for each new problem, and for the same old problems as they advance and are studied at a later date. Only by such a constant revaluation of resources and facts can an accurate answer to judgment problems be developed. Complete budgeting, that is, carrying of inputs through to add into the final output, is needed only in connection with the large changes which come when rather complete reorganization is necessary. In the case of an experienced farmer making the usual small step-by-step adjustments in organization and management which tend to keep the return on marginal units equal, the differential change in the factors affected is the usual method, and involves much less work than a complete re-budgeting. The farmer will aim at the solution of a particular problem in a carefully understood situation by revaluing each element in that situation at the very time it is necessary to make judgment. The decision may involve distinguishing between the long, intermediate, and short-time aspects of the farm business, with a different alignment and valuation of the facts for each. In particular, the fixity of the physical resources will need to be given careful consideration in this connection.

Albert Mighell

Iowa State College

PHASES OF LIVESTOCK MARKETING EXPENSE BY TRUCK AND BY RAIL

Students of livestock marketing appreciate the importance of the increasing use of motor trucks in livestock transportation and recognize the possibility of significant changes in livestock marketing practice through motorization. Currently, much discussion hinges on the relative expense of marketing by truck in comparison with marketing by rail.

Numerous explanations for the growing use of trucks are offered but most observers consider convenience and flexibility as having the greatest appeal to stockmen. Every man appreciates the convenience of having his stock picked up at the farm instead of having to haul or drive it to some other point of delivery. Greater flexibility of movement, with the opportunity of loading from the farm at any time of day or night, is attractive. But the question should not be decided solely on the basis of convenience unless other considerations are approximately in balance.

Four factors are important: (1) convenience, (2) expense, (3) risk, and (4) shrinkage. Convenience is difficult to measure definitely and is largely personal. Since it is readily possible to secure data that will allow hauling charge, risk and shrinkage to be definitely stated, the remaining expense may then be fairly charged to convenience.

Hauling expense, as paid by the shipper, is readily known. Shrinkage may be determined wherever accurate farm scales are available and, for comparative purposes, must be checked from farm to market on both truck and rail shipments. That few stockmen have taken such weights, though having farm scales available, indicates a feeling that shrinkage on truck shipments is insignificant. Cooperative studies of shrinkage from farm to market are under way in Illinois and in Indiana. Heretofore no satisfactory data have been available regarding losses from death and from crippling on livestock marketed by truck as compared with losses on similar stock marketed by rail. Risk data are being accumulated by different agencies. While relatively little is yet available it appears clear that losses in transit by truck are greater than some persons have believed. At any rate stockmen in several sections now patronize only those commercial truckmen who carry reliable loss coverage.

Table 1 worked out for an operator in central Illinois, on the basis of 1,000-lb. cattle and 250-lb. hogs, may prove helpful in deciding whether to ship by truck or by rail.

Convenience to the shipper is not a factor in the instance given in the table because a truck would load the livestock at the farm in either case, the owner having no further concern until his market returns were received. The returns would probably be received a day or even two days sooner if marketing was by truck.

In this case, then, the owner would be paying from 14 to 18 cents per hundredweight for the greater flexibility in movement to market afforded by truck, and for earlier returns, assuming that shrinkage would be balanced.

For managers of local cooperative livestock shipping associations, a table such as that worked out for one association in Illinois, may be helpful. Table

TABLE 1.—SHIPPING EXPENSE, BY TRUCK AND BY RAIL, FOR 1,000-LB. CATTLE AND 250-LB. HOGS

Item of Expense	*Cost per 100 pounds*			
	By truck		*By rail*	
	cattle cents	*hogs cents*	*cattle cents*	*hogs cents*
Hauling stock from farm to r.r. station..	—	—	10	10
Shipping association home expense, including sinking fund coverage.....	—	—	10	10
Freight	—	—	14	17
Truck charge, farm to market.....	45	45	—	—
Transit insurance	1.5	4	—	—
Higher yardage and commission charged on truck receipts	2.0	6.8	—	—
Shrinkage	†	†	†	†
Total	48.5	55.8	34	37

2 was based on records covering over 90,000 pounds of mixed livestock marketed by truck and over 130,000 pounds marketed by rail, during one year. Risk under both methods of shipping was covered by commercial livestock insurance.

TABLE 2.—COST OF SHIPPING LIVESTOCK BY RAIL AND BY TRUCK (ILLINOIS ASSOCIATION)

	Cost of shipping per 100 pounds	
	By rail	By truck
	Cents	*Cents*
Freight and insurance	26.08	—
Truckage and insurance	—	66.01
Terminal market expense	17.93	19.48
Total expense	44.02	85.49

In this case, owners were required to deliver all livestock to the local loading point. If 10 cents per hundredweight be allowed for local truckage the total expense by rail would be 54.02 cents, or 31.4 cents per hundredweight less than the truck transportation costs. No shrinkage data were available.

R. C. Ashby

University of Illinois

OUR CONGESTED FRONTIER

Economic congestion is not measured by the number of people per square mile, but by the ratio of the number of people to be supported to the sum total of economic opportunities for their support. According to this standard some of the most congested regions are the most sparsely populated. A good illustration of this point was discovered by the Congested Districts Board ap-

pointed by the British Government in the 90's of the last century. This board was constituted by the Land Purchase Act of 1891. This act provided that wherever there was any considerable area whose total taxable value when divided by the number of its inhabitants gave a quotient of less than 1 pound 10 shillings, the board was empowered to aid in the migration of a part of the people and in the amalgamation of the vacated farms in order that the remaining population might make a better living. A considerable sum of money was placed at the disposal of the board in order to enable it to carry out the projects of this act. The Act of 1891 was supplemented by others in 1893, 1896, 1899, and 1903.

One peculiar discovery of the Congested Districts Board was that congested districts, as defined in the act, were the most sparsely populated in Ireland. Where the population was sparse the land was sometimes so very poor as to make the quotient less than 1 pound 10 shillings, when the value of all property was divided by the number of the people. Measured by the same standard, the most congested dictricts in the United States are among the most sparsely populated, that is, the sub-marginal lands that are really too poor, either in moisture or in plant food, to be under the plow.

If our Federal and State Governments are really interested in some fundamental kind of farm relief, they might very well consider a situation in the United States similar to that which the Congested Districts Board found in Ireland. It is apparent to anyone who has studied the problem that one factor in the present agricultural situation is the overexpansion of our agricultural frontier. A great deal of what is technically called submarginal land has been brought under cultivation. The sooner it can be restored to the purposes for which it is best fitted, namely, forestry and pasturage, the better it will be for the American farmer and for the country at large. This would require not only an expansion of our policy of reforestation but the addition of a new and parallel policy of repasturation.

The process of forcing people to leave the farms is always a painful one. The individual leaves either because he is forced to do so by his inability to get work on a farm or by the fact that he loses money farming if he tries to farm independently. Of course, we can sit calmly by and let nature take her course, knowing perfectly well that in the course of time enough people will be forced out of farming and into towns to restore the balance between outdoor and indoor industries. If, however, there were some way of easing the process, there are strong humanitarian as well as economic arguments in favor of doing so.

The least we can do is to refrain from actively increasing agricultural overproduction. It is generally agreed that further reclamation work by the Federal Government should be suspended until the demand for farm products "catches up with the supply," which means that we should wait until the demand for farm products increases sufficiently to raise their prices to a remunerative level. It is now apparent, as many have long contended, that our reclamation work was somewhat premature.

Under the Homestead Law men have for more than a generation been allowed to take up land and bring it under cultivation faster than was necessary to supply the market for farm produce. This depressed agriculture

and produced a long train of consequences, including the abandonment of farms in the East and agrarian discontent everywhere. When the humid land was all occupied, our Government exerted itself to extend agriculture in the arid belt, both by encouraging dry-farming and by irrigation. Since a quarter-section (160 acres) was too small to enable a farmer to make a living by dry-farming, the Homestead Law was so modified as to permit the settler to take up first a half-section and then a section of public land as a homestead. The reclamation policy was designed to extend farming into the dry belt by means of irrigation. An irrigation system was planned and built at Government expense. The land brought under irrigation was then sold to settlers at the actual cost of the irrigation system.

Much of the dry-farming was disastrous to the settlers and injurious to agriculture in general. Where the land was on the border between humid and arid, that is, where the annual rainfall was from 20 to 25 inches and fairly dependable, dry-farming could be made to pay and in these areas the settlers are doing moderately well. In fact, dry-farming can be carried on successfully with 18 inches of rainfall if it is well distributed and if the soil is of the proper texture. The trouble was that dry-farming was extended too far and farmers were permitted, if not encouraged, to try dry-farming where it was altogether too dry, and their attempts were foredoomed to failure. The results were too tragic to be believed by anyone who has not travelled through these regions and seen the poverty of the farmers and the hopelessness of their struggle. To one who has studied this situation on the ground, it seems a crime even to have permitted, not to say encouraged, these people to enter upon such a hopeless contest against such overwhelming odds.

That the reclamation projects were, in the main, premature, is shown by the fact that the earning-power of most of this reclaimed land does not give it a value equal to the actual cost of reclamation. A consequence is that there is great discontent among the settlers. They are trying to pay the cost of reclamation when the reclaimed land is not actually worth the cost. Probably it is too late to undo the harm that was done by this premature reclamation policy, but we can, at least, desist from doing any more harm.

It is not too late, if we are willing to pay the cost, to undo at least a part of the harm that was done by encouraging settlers to try dry-farming where it was too dry to make success possible. Let the Government buy back from these settlers, say at from $1.25 to $5.00 an acre, as much land as they are willing to sell at these low prices. This would, in the first place, relieve some of the worst cases of poverty to be found anywhere in the United States, that is, among the settlers on dry land who cannot make a living and are really too poor to get away. Many of them would be glad to leave if they could raise enough money to pay their traveling expenses. Some of them, it is true, are hanging on under the vain hope, encouraged by land boomers, that the climate will improve or that something else will happen in their favor. Aside from relieving the individual settler, it would somewhat relieve agriculture in general to stop the flow of that thin stream of products which comes to market from these poor farms. It is a characteristic of an inelastic demand that a little surplus greatly depresses price and a little deficit greatly advances price. A slight reduction in the supply of

most of these farm products would make an appreciable difference in their prices.

The lands thus bought—and a good many millions of acres would be for sale even at these low prices—could be put into forest reserves if they were capable of growing trees, or into grass if they were too dry for trees. The Government would then enter upon a definite policy of repasturation to supplement its well established policy of reforestation. Both policies deserve a vast expansion not simply for the purpose of increasing supplies of lumber and grass, but also for the purpose of relieving agriculture on fertile land of the competition of farmers on sub-marginal lands.

Whether the land purchased under this plan is turned into forest or pasture, it would, in the long run, produce some revenue. Forests would yield lumber, and grazing rights on the pasture land could be leased to cattle and sheep men. Eventually, this would not be a great expense to the Government, though it would call for a considerable initial outlay.

This combined policy of reforestation and repasturation need not be limited to dry-land. It might well be extended to all large areas of marginal and sub-marginal land where farmers are trying to eke out a miserable existence on land that is too poor to yield a good living. Land of such low productive value should never be farmed at all, and the sooner it goes back to trees and grass, the better it will be for the country. Under the plow it is worth appreciably less than nothing. Any piece of land on which it takes a dollar's worth of labor to produce fifty cents worth of product, is worth less than nothing both to the owner and to the country at large. If the owner could be transferred to some place where a dollar's worth of his labor would produce a dollar's worth of product, he would be worth twice as much to the country as he is on this land. Or if this land which under its present use is worth less than nothing, could be turned to a use where it had even a very small positive value, that also would be better for the country. The policy here outlined has much to be said for it on the ground of humanity, but even more on the ground of constructive statesmanship.

T. N. Carver

Harvard University

BOOK REVIEWS

Farm Cost Studies in the United States, By Merrill K. Bennett, Food Research Institute. Stanford University Press. Pp. 289.

"This study undertakes a historical and critical examination of the literature of farm cost investigation in the United States, with the ultimate purpose of determining how far such investigation has contributed and may contribute to the solution of important economic problems." The book is the outgrowth of a study initiated about 1923 in order to find out more about the value of the various methods of conducting cost studies. In reading it, therefore, considerations should be given to the fact that the conclusions represent the results of several years of analysis of the literature of farm cost investigations by one who has been in a position to view the field with a detached perspective which is seldom possible for those who are themselves actively engaged in the prosecution of such studies. The lack of practical contact with the field places the author at a disadvantage at times, but those interested in this subject will find in the book a much needed critical discussion of methods of collecting cost data, problems of interpretation of results, and a general appraisal of the usefulness of the various types of studies.

So far as the weaknesses in farm-costs studies are concerned, which characterize a considerable portion of the field, the author is justified in the hope that "any reader can find herein a sounder and more thorough discussion of the significance of agricultural costs of production than he can discover in any other single source." Since such a wide range of subjects is covered, however, the treatment of many points is necessarily handled in somewhat summary fashion. Considering the scope of the field and the controversial character of some of the problems discussed it is to be expected that many farm economists will object to the manner of finality with which a number of problems are treated, as well as to some of the conclusions.

The conclusions stated in the final chapter which are of exceptional interest are as follows:

(1) "Statistics of money costs per unit of product are of negligible value in a program intended to increase farm efficiency; they contribute next to nothing to the theory of cost-and-price relationships in agriculture; and they do not provide a sound basis for price fixing or for tariff making."

(2) "Both differences and changes in costs are due quite as largely to uncontrollable natural causes—weather, diseases, and pests affecting costs through yield—as to causes controllable through good management. Farm management investigators appear not to have treated this possibility or its significance with the attention it deserves."

(3) Present proposals for farm management work should be overhauled because they are too ambitious, for "investigators cannot yet hope to solve the farmers' problems in planning for future operations and it would be desirable to admit the fact frankly."—"The nucleus of a desirable program would be organized effort to teach simple accounts to farmers, and the establishment of cooperative farm management services (of which an example

exists in Illinois) in which farmers bear the greater part of the expense for supervisors. These supervisors might be aided in their work by the collection of data on new machinery and methods, by correlation analyses of the factors affecting profits, by type of farming studies, by local market surveys, and by broader studies of trends in production, prices, and consumption.''

Although these conclusions are recognized by the author as ''largely destructive,'' they are, in a broader sense, largely constructive, since a critical and thorough examination of objectives and procedure is always in the interest of progress even if some of the criticisms are not fully justified.

The first point calls for no particular comment. A considerable group of agricultural economists have subscribed to similar views for many years but Mr. Bennett has rendered the field a real service by carefully focusing theoretical and statistical evidence upon these phases of farm cost studies. Unfortunately ''the considerable effort and expense which have gone into the collection and analysis of such data (on money costs) have largely been ill spent.'' Unfortunately also, considerable sums are still being ill spent in the same way, especially in connection with the farcial juggling of ineffective or partially effective tariff duties, perhaps on the theory that the consideration of the apparent fairness of the basis of adjustment together with the elaborate though unintelligent procedure followed in the so-called ''investigations'' will divert attention from the meager results obtained by their application.

On the second point, as to the relative importance of controllable and uncontrollable factors causing variations in farm costs and farm incomes, there is admittedly room for argument. Attention is here focused upon a problem which may well be given more attention in farm management investigations. On this point it appears that the author has perhaps been misled by ''a priori'' considerations on the one hand and on the other by the general inadequacy or inapplicability of much of the analysis of so-called farm cost or farm income data.

The statement that, ''generally speaking, differences in yields, costs, and profits are due more largely to uncontrollable than to controllable factors'' is practically nullified by the footnote explanation that ''this statement is intended to apply especially to field crops, and is, of course, the more valid as farms are widely scattered geographically.'' To be sure, the factors responsible for difference between yields, costs and profits of, say, wheat production in Oregon, West Virginia and Kansas are largely uncontrollable. But comparisons of yields, costs and profits for farms that are ''widely scattered geographically'' are futile for most purposes anyway. Certainly for use in farm management studies the data should, as far as possible, be for a limited area where conditions as to soil, topography, rainfall and other natural factors which affect yields are similar for all farms. Under these conditions it may confidently be expected that the controllable differences in yields, profits, costs and farm incomes are sufficient to justify the use of public funds in order to obtain the data necessary to formulate sound suggestions for increasing farm incomes—unless of course one wishes to take the view that differences due to managerial practices are uncontrollable and that the whole

program of adult education of farmers should be abandoned. This is not to say, however, that it is easy or ever will be easy to obtain complete data upon such a group of comparable farms which may be used in a multivariable analysis for determining the degree of association of each factor with farm profits and upon which may be superimposed a further analysis to determine the extent to which the various factors are subject to control. Shall the ability to control be decided upon the basis of one year's results? Or five? The problem is worthy of further study and unquestionably Mr. Bennett is justified in stating the question with emphasis.

On the third point, that of a program for work in farm management, the author's views are both interesting and very helpful but in the main are not convincing. The views of the so-called "majority" and "minority" schools are not properly interpreted. This is evidenced by the fact that, while the view of the "majority" school is largely rejected as being too ambitious, the author's program calls for "type of farming studies," "local market surveys" and "broader studies of trends in production, prices and consumption." Of what value are type of farming studies except as they help one "to mark off important areas" which become the unit for special analyses of farm management problems? Why make "broader studies of trends in production, prices and consumption" unless they are to aid in looking to the future and in providing farmers with useful information upon which their production plans may be adjusted more intelligently than they have been in the past? It appears that the author has gained only an initial view of some of the essential elements in a broad program of farm management work and has failed to follow it through to the development of a complete program.

The discussion of "Types of Farm Management Investigation in Recent Years" and of "A Program for Farm Management Investigation" constitutes a challenge to farm management workers to reappraise their objectives and methods and to restate their programs in the light of the experience and criticism of the past few years. Mr. Bennett's book should do much to help dispose of a great many ideas which have been all too prevalent in the conduct of farm management research. It still remains for someone to take the nucleus of the program as suggested and develop it into a well-rounded, consistent program which not only recognizes all of the difficulties that have been emphasized but that also takes into account a more realistic appreciation of the needs of individual farmers with respect to types of information that will be helpful in adjusting their plans from year to year and over a period of years.

Jesse W. Tapp

New York, N.Y.

"Forecasting Wheat Yields from the Weather," by Carl L. Alsberg, with the assistance of E. P. Griffin. Vol. 2, No. 1, of Wheat Studies of the Food Research Institute, Stanford University, Calif. $1.00.

The purpose of this treatise, as stated by the authors, is to "bring together what is known concerning the forecasting of yields of wheat from the weather and to present as simple and lucid a picture as possible of the status of existing knowledge of this problem."

The conclusions may be paraphrased about as follows: In the course of the last forty years a fairly considerable literature on methods of forecasting yields from the weather has been published. Study of this literature leaves the reader baffled and confused. The one fact that stands out clearly is that the problem is far from solved. Nevertheless, in spite of all of the complexities involved, there is reason to believe that if competent investigators continue to address themselves to the problem as assiduously during the next twenty years as they have in the past twenty, the forecasting of crops from the weather—or at any rate from environmental factors—may be at least as satisfying as by the present subjective methods; probably much more so. But the forecasting of yields from the weather cannot safely be left wholly in the hands of the agricultural meteorologist, or of the statistician, or of the agronomist. The successful solution requires cooperation of all of these, together with that of the physiologist. Such cooperation will have to be maintained for many years to come in order that forecasting may not leave out of consideration new factors resulting from changes in agricultural practice or failure to apply new discoveries in the several sciences. It is hoped that interest in the possibility of forecasting yields from the weather may be stimulated and that biologists in particular may be aroused to attack some of the fundamental laws of growth of crop plants upon the solution of which in the last analysis depends the solution of the problems of forecasting crop yields by objective rather than by subjective methods (that is, by the present method of the Department of Agriculture, based upon opinions of crop reporters.)

The treatise is largely a review, academic rather than technical, of the literature upon the subject. Emphasis is given to the biological laws of crop growth in the discussion of the problem, probably because Dr. Alsberg the author is by education and experience a biological chemist, and not a crop statistician, nor a meteorologist. As typical of his approach to the subject, is the following paragraph in the discussion of the heat factor in plant growth: "Cold retards all vital processes till at given temperatures they practically cease, whereas warmth speeds them up till at certain degrees of heat life ends. The limiting temperatures, and the effects of temperature within these limits, are different for different species and varieties. So far as the effects of temperature are concerned, vital processes resemble chemical processes. Many chemical reactions approximately double their rate for each 18° F rise in temperature. This is known as Van't Hoff's Law. Living things react to changes in temperature in somewhat similar proportions, and many experiments have been performed to prove that they obey Van't Hoff's Law, though without conclusive results. The point to be noted in this connection is that the activity of living things does not increase directly in proportion to the rise in temperature."

In the discussion of the moisture factor in plant growth, it is pointed out that soil moisture is more significant than precipitation, but that precipitation data are more easily available; "it is not unlikely" says the author, "that the moisture content of the soil at different depths may prove to be a better index of probable yield than rainfall. Similarly, records of soil temperature at different depths may prove a better index during the germination

period than air temperature.'' As a result of this suggestion, so the reviewer has been informed, Illinois is now making plans for systematic periodical soil moisture and temperature records at the nineteen experiment farms in different parts of the State; and it is hoped that other States will do likewise.

The authors' criticism of the present usual method of forecasting yields, which they call the subjective method, is that it is based upon opinions or judgment; and that mere opinions are not trustworthy. It would have been better, it seems to us, if the authors had been more concrete, and had given some data in regard to the actual error of such judgment reports when used as forecasts. This could have been done easily. For eighteen years the Government has been making yield per acre ''forecasts'' from its judgment condition reports. These can be compared readily with the finals. For example, in regard to corn, the average difference between the final yield per acre figures and the October 1 ''forecasts'' during these eighteen years, has been only 2.1 per cent; the difference between the finals and the September 1 ''forecasts'' has been 3.3 per cent; similarly, for August 1, 5.9 per cent; and for July, 7.6 per cent. For winter wheat, the average difference between the final yield per acre figures and the July ''forecasts'' from judgment condition estimates has been 5.4 per cent; June 1, 7.8 per cent; and May, 8.2 per cent. Spring wheat, in a similar way shows a difference of 5.7 per cent between the finals and the September 1 ''forecast'' figures, 10.1 per cent for August 1 figures, and 21.1 per cent for July 1. For oats the difference between the finals and September 1 ''forecast'' figures was 2.7 per cent; August, 4.9 per cent, and July, 9.1 per cent. Similar comparisons could have been given for the many other crops reported upon. The authors do not show that any forecast formula based upon weather data has yet been developed which gives greater accuracy as forecasts than the comparisons given above. It is true that Moore is quoted, who claimed that his cotton forecast equation gave better results than the Government estimates. But what Moore did was to compare his ''line of best fit'' with the Governments ''forecasts.'' The reviewer used Moore's formula to forecast yields in years subsequent to the years upon which his formula was based, and found that as a basis of forecasting it was inferior to the forecasts by the Government based upon judgment reports in the same years. There is an important distinction between the ''best fit'' of a correlation equation and ''forecasts'' from such equations, which apparently escaped the attention of the authors. But even errors of ''best fit'' from weather-crop equations with high correlation ratios are rarely less than 7 or 8 per cent. We may have a correlation of, say, 0.950 which is an unusually high ratio, and still have an average error of 10 per cent or more.

In the discussion of the present method of crop forecasting, the following observation is made: ''In the United States, condition figures have for a great many years been expressed as a percentage of a hypothetical normal. There exists a difference of opinion whether figures are best expressed in percentage of such a normal or of the ten-year average.'' The reviewer believes that there is no difference of opinion whatever upon this subject among those who have had actual experience in collecting and interpreting crop data

from first hands. Any opinion favoring the ten-year average basis is an a priori opinion, and not based upon experience. In Canada, some years ago, a new inexperienced Government crop statistician adopted the ten-year-average basis, with the result that the Canadian forecasts based thereon became so inconsistent with known facts that last year they were discontinued.

Exception is also taken to the statement that "the inherent defects of this method of crop estimating (that is, as used by the U. S. Department of Agriculture) are now so well recognized that many countries make no official forecasts of the volume of crops in advance of harvests." A better reason would be that such other countries are less progressive than the United States in this respect.

The reviewer does not wish to appear critical of the paper, but merely to rebut some of the criticisms which the authors have directed against the Department of Agriculture's method of crop estimating and forecasting. The staff of the Government Crop Reporting Service is alive to the merits and defects of its present system, to the merits and defects of the weather-crop correlation methods, and to improvement of the service by research studies, to an extent apparently not appreciated by the authors of "forecasting wheat yields from the weather."

The paper is an excellent review expressed in general terms of the extant literature on the relation of crop growth to various weather influences; as, for example, the distinction between the influences upon vegetative and reproductive growth; the critical periods when weather is more important than at other times; the relation of calendar dates to stages of plant growth; also to the status of long-range weather forecasting, and short-range forecasting; to interrelations of weather factors; to treatment of loss from hail and hurricanes and crop failures; to change in the trends of yields, etc. Many authorities are quoted in the text, and a good bibliography of the subject is given at the end.

Nat C. Murray

Chicago, Illinois

BOOKS RECEIVED

Filley, Horace Clyde. *Cooperation in Agriculture.* New York: John Wiley, and Sons, 1929. 468 pp. $4.00.

International Agrarian Institute. *Index Bibliographique,* vols. 1, nos. 1-3. Moscow, 1928. (First issues of a new bi-monthly series. Lists books, pamphlets and periodical articles classified under 16 headings. Citations are in the language of the original publication, without comment.)

Harvey Fisk and Sons. *The Tractor Industry and its part in Power Farming.* New York: Harvey Fisk and Sons, 1929. 35 pp.

Sherman, Wells A. *Merchandising Fruits and Vegetables; a new billion-dollar industry.* Chicago and New York: A. W. Shaw Company. 1928. 499 pp. To be reviewed.

BOOK NOTES

Studenskii, G. A. *In reference to defining and measuring of the intensity of agriculture.* (Samara, 1926. 37p.)

Issued by the Samara Agricultural Institut (Samara. Sel'sko institut) Samara, Russia.

Text in Russian; summary in English.

The author states in the English summary that the chief purpose of this pamphlet is to prove that quantitative measurements are the only means by which the problem of the intensity of agriculture and most other subjects pertaining to agricultural economics can be studied. "Agricultural economics should be a science based on quantity methods."

Prudhomme, Claude. *La question des halles et le problème actuel du ravitaillement de Paris.* Paris, Librairie générale de droit et de jurisprudence, 1927. 221p. Published at 20, Rue Soufflot (5e Arrt), Paris, France.

It has become a custom in France to make the market of les Halles responsible to a large extent for the high cost of living. This market has played an essential part in the provisioning of Paris, and its influence is preponderant in determining market prices all over the country. But, while the author admits that much might be done to improve conditions as they are today, he argues that public opinion has been led astray by reports that are more or less legendary, and that ignorance of causes has led to the suggestion of inadequate remedies.

The organization of the market of les Halles is complex. Contradictory interests must be conciliated in order to insure its proper functioning. The interest of the consumer requires a regular supply of all kinds of commodities. It is a national as well as an urban market, the outlet for a large number of agricultural regions. And the interest of the producer must not be sacrificed to that of the consumer. The problem of les Halles is one of a thousand conflicting interests that must be reconciled, and it is the study of this problem that forms the subject of the author's thesis.

The market is under the jurisdiction of the prefect of the Seine and the prefect of police of Paris. The latter determines the days and hours on which the market may be held, and is responsible for the maintenance of order, the prevention of fraud, and the sanitary condition of the market. At the end of each day the highest, average, and lowest price obtained for each commodity is posted.

The author admits that this market has long since outgrown its bounds, and that much might be done to improve conditions as a whole, but he does not think that the removal of the market to another site is feasible.—From a review by A. M. Hannay.

Fay, C. R. *Great Britain from Adam Smith to the present day; an economic and social survey.* New York, London [etc.] Longmans, Green and Co., 1928. 458p.

The chapter on agriculture is of much interest, especially the "contrast between British and American agriculture."

Tooke, Thomas, and Newmarch, William. *A history of prices and of the state of the circulation from 1792 to 1856.* Reproduced from the original. With an introduction by T. E. Gregory. London, P. S. King and son, ltd., 1928, 6v. in 4

The re-issue of this well-known work, which has been out of print for many years, will be welcomed by all economists because of its great importance. The "Introduction" by Professor T. E. Gregory is an invaluable summary and evaluation of the monumental work in the light of 1928.

"The first portion of the History (constituting Volume I of this re-issue) appeared in two volumes in 1838. This covered the period from 1792 to 1837. A new volume appeared in 1840. This purported to deal only with the two crisis years 1838 and 1839. In 1848 there appeared a further volume—the last with only Tooke's name upon the title-page—bringing the history down to 1847; the last two volumes, covering only the ten years since 1847 but comprising the greater portion of the work as a whole (nearly 1600 pages out of a total of 2800, exclusive of the index to the whole), appearing as a joint product in 1857, a year before Tooke's death."

British Columbia. Dept. of agriculture. Bulletin no. 103. *Dairy-farming in British Columbia; an economic study of 726 farms.* A five-year summary, by H. R. Hare. Victoria, B.C., Printed by C. F. Banfield, printer to the King's Most Excellent Majesty, 1928. 101p. (College of agriculture bulletin no. 12)

For seven years the Department of Animal Husbandry of the University of British Columbia, through the co-operation of the dairymen of British Columbia, has secured in the course of these years complete detailed data bearing upon the individual dairy-farm business of from 56 to 186 farms. This material has been brought together by field men; that is, men who personally visited the farmers and secured from them detailed information."

Institute of politics, Williams college. *Report of the round tables and general conferences at the eighth session.* Ed. by Richard A. Newhall, Williamstown, Mass., 1928. 209, Al-All8p.

Contains the syllabus of the Round Table on Agriculture and the Agricultural Surplus: An International Approach, and a summary of the discussion at the Round Table of which C. R. Fay, Professor of Economic History at the University of Toronto, was chairman.

Carslaw, R. McG., and Kirkpatrick, W. H. *An economic and financial analysis of fifteen east Anglian farms, 1926-27.* Cambridge, W. Heffer & sons, Ltd., 1928. 170p. (Cambridge, Eng., University. Dept. of Agriculture. Farm economics branch. Report no. 10)

"This Report, like its predecessors, is based on a complete system of cost accounts (kept on the double entry system) for each individual farm analyzed in it."

Canadian wheat pool, Winnipeg. *Wheat prices 1927-28. The pool and the grain trade.* Winnipeg, 1928. 6p.

Contains four graphic charts with discussion, showing (1) comparison of wheat pool and grain exchange prices 1927-28; (2) comparison of Alberta pool and non-pool prices of street wheat 1927-28; (3) comparison of Saskatchewan pool and non-pool prices for street wheat 1927-28, and (4) comparison of Manitoba pool and non-pool prices for street wheat 1927-28.

STATE PUBLICATIONS

Compiled by Mary F. Carpenter, Library, Bureau of Agricultural Economics, U. S. Department of Agriculture

ALABAMA

Alabama. Dept. of agriculture and industries, Montgomery. Alabama farm production. v. 2, no. 4, Jan., 1929.
Gives estimated acreage, production and value of crops by countries for the year 1928.

CALIFORNIA

Shear, S. W. Prune supply and price situation. (Calif. Agr. Exp. Sta., Berkeley. Bul. 462. 1928. 69 p.)

Voorhies, E. C., and Koughan, A.B. Series on California crops and prices. Economic aspects of the beef cattle industry. (Calif. Agr. Exp. Sta., Berkeley. Bul. 461. 1928. 128 p.)

Wellman, H. R., and Braun, E. W. Series on California crops and prices. Grapefruit. (Calif. Agr. Exp. Sta., Berkeley Bul. 463. 1928. 35 p.)

COLORADO

Coombs, Whitney, Moorhouse, L. A., and Seeley, B. D. Some Colorado tax problems. (Colo. Agr. Exp. Sta., Fort Collins. Bul. 346. 1928. 87 p.)

Summers, T. H., and Shafer, R. W. An agricultural program for northwest Colorado. (Colo. State Agr. Col. Ext. Service, Fort Collins. 1928. 60 p.)

CONNECTICUT

Storrs agricultural experiment station. Storrs. Report. 1928.
Projects active, 1928-1929, include: The economic significance of soil type; Economic study of the tobacco industry; Study of tobacco farms in selected areas; The origin and character of the rural population.

FLORIDA

Florida. Dept. of agriculture, Tallahassee. Citrus growing in Florida. (Bul. 2, new ser. 1928. 82 p.)
Includes statistics of production for a series of years, estimated cost of a forty-acre grove on high pine land for first five years, prices, and marketing.

Florida. Dept. of agriculture, Tallahassee. Florida, an advancing state. An industrial survey. 1928. 342 p.
Index, p. I-X.

ILLINOIS

Ashby, R. C. Livestock trucking by Illinois shipping associations. (Ill. Agr. Exp. Sta., Urbana. Circ. 331. [1928] 27 p.)

Brown, C. A. Costs and margins and other related factors in the distribution of fluid milk in four Illinois market areas. (Ill. Agr. Exp. Sta., Urbana. Bul. 318. 1928. p. 171-282.)

Clemen, R. A. The possibilities of developing new industrial markets for farm products. (Ill. Agr. Exp. Sta., Urbana. Circ. 330. 1928. 24 p.)

An address delivered before the faculty of the College of Agriculture of the University of Illinois, April 13, 1928.

IOWA

Shepherd, G. S. When shall we sell our corn? (Iowa Agr. Exp. Sta., Ames. Circ. 113. 1929. 23 p.)

This is a revision of the subject matter contained in two previous bulletins—Current economic series 1, Profits and costs of storing corn on Iowa farms, and Current economic series 4, The bumper corn crop surplus.

KENTUCKY

Kentucky. Agricultural experiment station, Lexington. Fortieth annual report. . . . . 1927.

Research projects include: A business analysis of certain farms in several counties; Cost of production studies in Central Kentucky; Farm tenancy studies; Agricultural credit and finance; Poultry and egg marketing.

MASSACHUSETTS

Mighell, R. L., Yount, H. W., Branch, F. H., and Rowe, H. B. Dairy replacements in Massachusetts. (Mass. Agr. Col. Ext. Service, Amherst. Ext. Leaflet 120. 1928. 15 p.)

"Prepared under the direction of the Committee on the economic status of Massachusetts agriculture."

MICHIGAN

Michigan. Agricultural experiment station, East Lansing. Quarterly bulletin, v. 11, no. 2, November, 1928. p. 47-90.

The amount of livestock kept and the production per animal influence the financial success of the farm, by E. B. Hill, p. 47-51. This article is the second of a series on "Factors affecting the farm income."

MINNESOTA

Minnesota. Dept. of agriculture, St. Paul. Minnesota state farm census, 1927. (Bul. 61. 1927. 9 p.)

Includes acreage of crops and number of tractors and auto trucks by counties.

Sherwood, R. C. Report of operation, State testing mill, crop season of 1926. (Minn. Dept. of Agr., St. Paul. Bul. 62. 1928. 35 p.)

Results of milling and baking tests of wheat.

MISSISSIPPI

Long, L. E., and Kifer, R. S. Systems of farming for the hill sections of Mississippi. (Miss. Agr. Exp. Sta., A. & M. College. Bull. 257. 1928. 50 p.)

MISSOURI

Elkins, R. M. Marketing eggs in Missouri. (Mo. State Board of Agr., Jefferson City. Bul. v. 26, no. 2. 1928. 31 p.)

Thomsen, F. L., and Thorne, G. B. Economics of strawberry production and marketing in Missouri (Mo. Agr. Exp. Sta., Columbia. Bul. 262. 1928. 138 p.)

MONTANA

Montana. Dept. of agriculture, labor and industry. Division of publicity and real estate. A comparison of Canadian and United States wheat standards. (Montana, v. 2, no. 2. 1927. 12 p.)

NEW JERSEY

New Jersey State college of agriculture, New Brunswick. The agricultural outlook for New Jersey farmers. 1929. 9 p. Mimeographed.

NEW MEXICO

Hauter, L. H. Economics of crop production on the Elephant Butte irrigation project. (N. Mex. Agr. Ext. Service, State College. Ext. Circ. 97. 1928. 48 p.)

The first of a series of five circulars to be issued "as a direct outgrowth of the Economic Conference held at State College, New Mexico, February 15 and 16, and at El Paso, Texas, February 18 and 19, 1927."

Hauter, L. H. Sheep and cattle on southern New Mexico irrigated farms. (N. Mex. Agr. Ext. Service, State College. Ext. Circ. 98. 1928. 54 p.)

Another of the series mentioned above.

NEW YORK

Melvin, B. L. Rural population of New York, 1855 to 1925. (N. Y. Cornell, Agr. Exp. Sta., Ithaca. Memoir 116. 1928. 121 p.)

New York (Cornell.) Agricultural experiment station, Ithaca. Forty-first annual report. 1928. 170 p.

A review of the work in agricultural economics and farm management for the past four years is given on p. 60-65, with lists of studies completed and under way.

NORTH CAROLINA

Saville, R. J. Systems of livestock farming for the mountain region of North Carolina. (N. C. Agr. Exp. Sta., Raleigh. Bul. 260. 1928. 55 p.)

The third of a series on farm organization. Research bulletin no. 1 of the State College Bureau of Economic Research deals with the Coastal Plain, and Bulletin 252 of the Agricultural Experiment Station refers to the Tidewater area.

NORTH DAKOTA

Benton, A. H., and Seielstad, H. E. Cooperative marketing of livestock in North Dakota. (N. Dak. Agr. Exp. Sta., Fargo. Bul. 233. 1928. 63 p.)

North Dakota. Commissioner of agriculture and labor, Bismarck. Twentieth biennial report for the period ending June 30, 1928. 100 p.

Most of the report consists of crop, livestock, and dairy statistics by counties.

OHIO

Foster, L. G. A business study of the Ohio poultry producers' cooperative association. (Ohio Agr. Exp. Sta., Wooster. Bul. 427. 1928. 38 p.)

Ohio. Agricultural experiment station, Wooster. Bimonthly bulletin, v. 14, no. 1, Jan.-Feb., 1929. 32 p.

Partial contents: The operation of large land holdings in Ohio, by P. G. Minneman and J. I. Falconer, p. 27; Farm business summaries for 1925-26-27, by J. I. Falconer, p. 28-31.

PENNSYLVANIA

James, D. M. The fruit and vegetable supply for fifteen cities. (Pa. Dept. of Agr., Harrisburg. Bul. 461. 1928. 98 p.)

James, D. M. What shipping point inspection is and what it accomplishes. (Pa. Dept. of Agr., Harrisburg. Gen. Bul. 464. 1928. 10 p.)

Lininger, F. F. The relation of the basic-surplus marketing plan to milk production in the Philadelphia milk shed. (Pa. Agr. Exp. Sta., State College. Bul. 231. 1928. 63 p.)

"The study is limited to the problems of milk production arising under the basic-surplus plan and aims to secure information that will be helpful to dairy farmers in making the best adjustments to this plan of selling milk."

SOUTH CAROLINA

Carkuff, A. M. An agricultural survey of the Charleston area. (S. C. Agr. Exp. Sta., Clemson College. Bul. 253. 1928. 62 p.)

"This study has as its objective, what the planters of the Charleston area should produce and an analysis of typical farms having the best practices found in the area."

Jensen, W. C., and Carkuff, A. M. Irish potato outlook, South Carolina, 1929. (S. C. Agr. Exp. Sta., Clemson College. Circ. 34. 1928. 16 p.)

South Carolina. Agricultural experiment station, Clemson College. Forty-first annual report. . . . . 1928. 95 p.

Research work in agricultural economics, p. 6-17. Projects under way, p. 91.

UTAH

Thomas, W. P., and Cardon, P. V. An economic study of the apple industry of Utah, 1926 and 1927. (Utah Agr. Exp. Sta., Logan. Bul. 208. 1928. 72 p.)

TEXAS

Jones, D. L., Hurst, W. M., and Scoates, D. Mechanical harvesting of cotton in Northwest Texas. (Texas Agr. Exp. Sta., College Station. Circ. 52. 1928. 31 p.)

Cost of harvesting and ginning, p. 16-18.

VERMONT

Bell, E. W. Studies in Vermont dairy farming. IV. Cabot-Marshfield area. (Vt. Agr. Exp. Sta., Burlington. Bul. 283. 1928. 24 p.)

Vermont. Dept. of agriculture, Montpelier Fourteenth biennial report. . . . . 1926-1928. 155 p.

Receipts of milk and cream by counties for 1926 and 1927, p. 25-49; Report of the Bureau of markets, p. 50-69; Vermont census of silos and livestock by counties for 1927, p. 125-155.

VIRGINIA

Shaffer, B. E. Packing and loading basket apples. (Va. Dept. of Agr. Div. of Markets, Richmond. 1928. 3 p.)

WISCONSIN

Macklin, Theodore, and Schaars, M. A. Cooperative butter marketing in Wisconsin. (Wis. Agr. Exp. Sta., Madison. Bul. 401. 1928. 39 p.)

Includes some data for Iowa and Minnesota.

Montgomery, D. E. Cooperative oil marketing in Wisconsin and Minnesota. (Wis. Dept. of markets, Madison. Bul. v. 9, no. 3. 1928. 16 p.)

This is a reprint of Bul. v. 8, no. 4, with the addition of "a supplement on 1927 operations in Wisconsin."

Peterson, A. H. How to buy dairy hay. (Wis. Dept. of markets, Madison. Bul. v. 9, no. 4. 1928. 10 p.)

Wisconsin. Dept. of agriculture, Madison. Wisconsin agriculture. A statistical atlas. 1926-1927. (Joint bul. 90. 1928. 102 p.)

In cooperation with the U. S. Bureau of Agricultural Economics.

The last bulletin on statistics of Wisconsin was no. 74 issued in 1926. In the current one new material on farm expenditures, dairying, population and rural living standards is included. "It is unlikely that another will be prepared before the material of the next Federal Census in 1930 becomes available."

Wisconsin Dept. of markets, Madison. Wisconsin standards for grading, packing and certification of apples and cherries. (Bul. v. 9, no. 2. 1928. 28 p.)

PUBLICATIONS FROM THE BUREAU OF AGRICULTURAL ECONOMICS[1]

Issued January 7—March 29, 1929

TECHNICAL BULLETIN

102 Types of farming in North Dakota, by F. F. Elliott, Jesse W. Tapp, and Rex E. Willard.

FARMERS' BULLETINS

1042 Saving man-labor in sugar-beet fields, by L. A. Moorhouse and T. H. summers. Revised by R. H. Washburn.

1539 High-grade alfalfa hay; methods of producing, baling, and loading for market, by Edward C. Parker.

MISCELLANEOUS PUBLICATIONS

33 Advantages of standards for livestock and meats, by C. E. Gibbons.

44 Agricultural outlook for 1929.

50 (Circ.) The Angora goat and mohair industry, by the Interdepartmental Angora goat and mohair committee.

American Atlas of agriculture, part I. The physical basis of agriculture, sec. 3; temperature, sunshine, and wind, by O. E. Baker and J. B. Kinser.

LEAFLET

33 The combination cleaning and treating of seed wheat, by F. C. Meier, E. G. Boerner, G. P. Bodnar, C. E. Leighty, and J. Earl Coke.

[1] Periodicals and mimeographed preliminary reports are not included.

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NEWS NOTES

The agricultural economics students at Harvard University have organized themselves into a discussion group which meets twice a month. Outside men who have led discussions during the year are Professor A. W. Ashby, University of Wales, Mr. H. R. Tolley and Mr. Chris. Christensen of the Bureau of Agricultural Economics, Dr. H. C. Taylor, and Professor N. S. B. Gras.

The Bureau of International Research at Harvard has recently approved a project for a study of the agricultural and population statistics of the various countries with a view of determining their comparability.

A new publication, *Contributions to Canadian Economics*, has recently made its appearance. The contributors are all members of the staff of the Department of Political Economy at the University of Toronto. The "feature" article, "An Introduction to Canadian Economic History," is from the pen of the late James Mavor. A select bibliography of publications on Canadian Economics during 1927-28 is also given.

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THE AMERICAN FARM ECONOMIC ASSOCIATION

CONSTITUTION

ARTICLE I

Name.—The name of the Association shall be The American Farm (Management) Economic Association.

ARTICLE II

Object.—The object of this Association shall be to promote the investigation and teaching of farm management and other economic questions pertaining to agriculture.

ARTICLE III

Membership.—The membership shall consist of persons interested in Farm Management and Farm Economics.

ARTICLE IV

Organization.—The officers shall be a President, Vice-President, and a Secretary-Treasurer, who shall be elected for one year, and who shall serve until their successors shall qualify.

The Executive Committee shall consist of the active officers, and two latest past presidents, and shall have the power of appointing committees, selecting time and places of meeting, and of bringing to the attention of the members any matter which in their judgment should be considered by the Association.

There shall be three standing committees appointed annually by the Executive Committee. One of these committees shall consider the lines of investigation best adapted to the needs of the work of farm (management) economics at the present time and shall suggest to various investigators plans of correlation and cooperation in the work It shall be the duty of this committee to collect, as far as possible from investigators, the lines of work to be carried out each year. The second committee shall investigate the methods of lecture and laboratory work in farm (management) economics and make suggestions to members of the Association and to Colleges intending to organize courses in farm (management) economics. It shall be the duty of the third committee to report on extension work in farm (management) economics.

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HANDBOOK

of the

American Farm Economic Association

1928

$1.50 a copy

SUPPLEMENT to VOL. XI, No. 2
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NEWS NOTES

The agricultural economics students at Harvard University have organized themselves into a discussion group which meets twice a month. Outside men who have led discussions during the year are Professor A. W. Ashby, University of Wales, Mr. H. R. Tolley and Mr. Chris. Christensen of the Bureau of Agricultural Economics, Dr. H. C. Taylor, and Professor N. S. B. Gras.

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